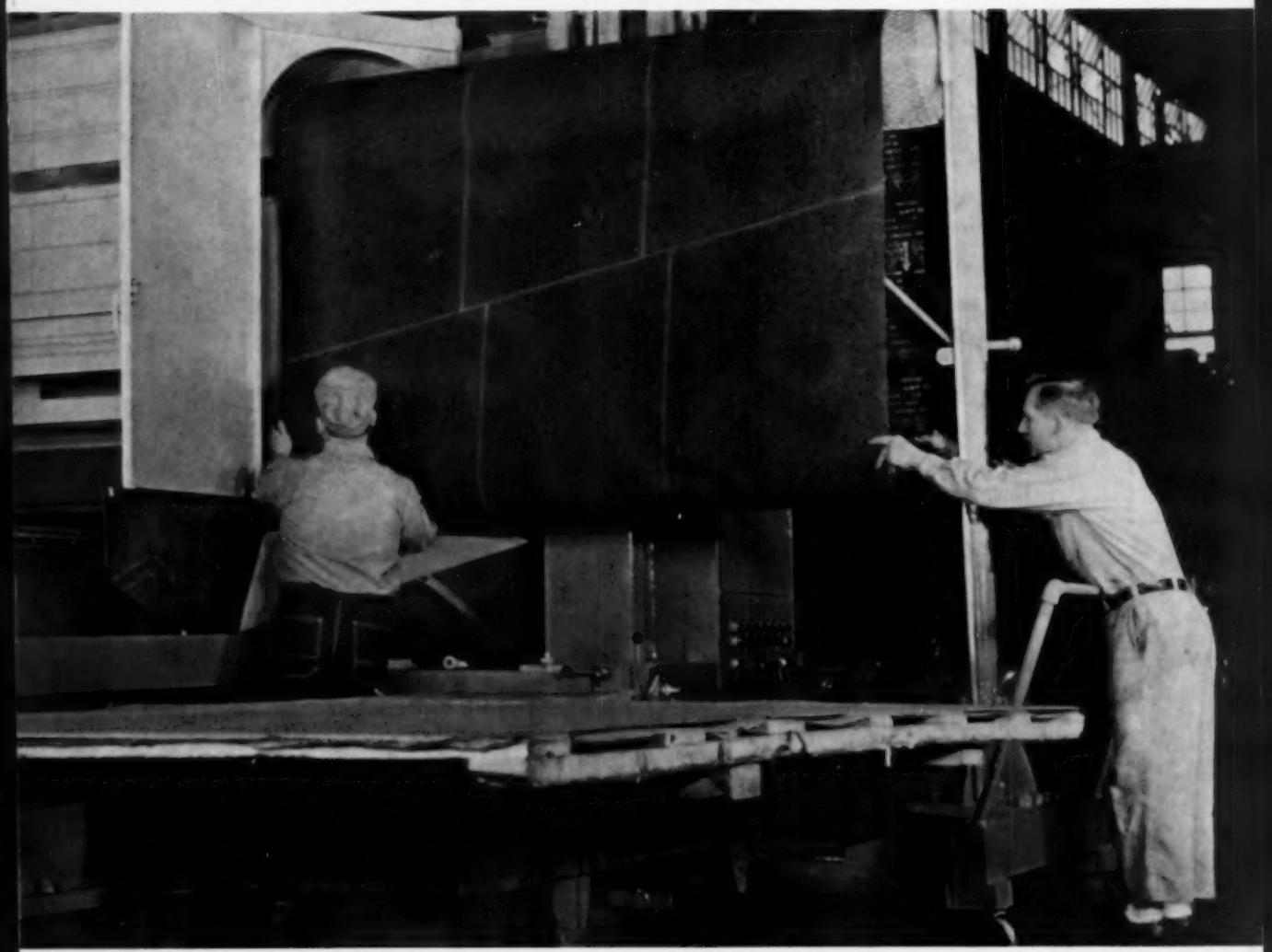
The Iron Age

A Chilton Publication

THE NATIONAL METALWORKING WEEKLY • MARCH 24, 1955

What is Soviet management really like?
See page 54



It takes two men to load the 86" wide Behr-Manning abrasive belt on this Hill-Acme Machine. Machine sets new standards of speed and accuracy in grinding large aluminium flats.

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A giant Behr-Manning abrasive belt for a mammoth polishing job

SEE PAGES 22, 23

Chromel-Alumel

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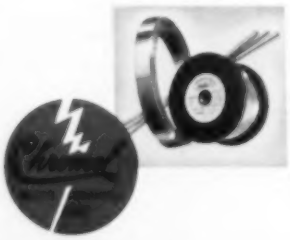

Why These Circular Forgings Have So Many Uses

It's become second nature for many manufacturers to call for Bethlehem forged-and-rolled circular forgings. These round forgings are so strong, and machine so beautifully, that they are top choice for many jobs. What's more, they come in sizes from 10 to 42 in. OD, giving them a still broader range of application.

Here are a few of the products being made today from these circular forgings: spur, bevel, herringbone, and other types of gears; double-flange crane-track wheels; industrial wheels of many kinds; turbine rotors and bucket wheels; clutch drums; brake drums; pipe flanges; sheave wheels and flywheels; tire molds and mold rings.

There are of course many others, some highly specialized. For instance, Filer & Stowell, world's largest builder of heavy-duty sawmill machinery, uses these blanks in the making of its carriage wheels. A sawmill carriage is subjected to some mighty heavy burdens, and the strength inherent in Bethlehem circular blanks makes design problems easier. Two kinds of Bethlehem wheel blanks are used at the F & S plant, and one of the finished wheels is shown in the photograph above.

In the making of your own products, there may be ways in which these sturdy forgings can add to the overall strength. If you would like to have additional information, just write for a copy of Booklet 216. It's filled with illustrations, and it contains many ideas that could be of real help to you.

BETHLEHEM STEEL COMPANY
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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

the iron Age

Vol. 175, No. 12, March 24, 1955

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Address mail to 100 E. 42 St., N. Y. 17, N. Y.

NEWS DEVELOPMENTS

$800 MILLION EXPANSION FOR STEEL IN '55—P. 51
Expansion and modernization programs planned by steel companies for 1955 will amount to $800 million. This will be the fourth largest buildup in the industry's history. Stress is on raw materials and finishing capacity.

WHAT'S THE STORY ON RED PRODUCTION — P. 54
American businessmen are skeptical of Russian production figures, knowing what even mild central controls can do to efficiency. Failure in Russia means Siberia but bureacratic maze will often defeat any fear stimulus. Markets, wages, materials, and hours are other factors covered.

OIL COUNTRY DEMAND GOOD THROUGH 1955 — P. 58
From deep in the heart of the market area, Lone Star Steel president tells THE IRON AGE inventories are dangerously low. Electric weld tube market will benefit by deep drilling. Cast iron pipe outlook in Southwest gets boost from population boom.

BIG ORDERS CREATE STAMPING BACKLOG — P. 60
Stamping production rate follows booming auto and steel industries. Backlogs are lengthy and production up over 1954. But higher costs and smaller job margins cut into total profits. Smaller shops find it tough going competing against mechanized ones.

WHY THERE WON'T BE AN AUTO STRIKE — P. 65
Despite Walter Reuther's GAW tub-thumping and the auto industry's firm opposition, there won't be an automotive strike this year. When negotiations reach the smoke-filled room stage, automakers will offer a diluted form of GAW. Reuther will claim victory, the automen will say their concession is only a form of company unemployment insurance.

TRUCKS GET FULL STYLING TREATMENT — P. 68
Styling and design get most attention on new truck models. GMC trucks have first wraparound windshields, hidden bumpers, passenger car cab lines. New light weight diesel also featured. Ford public sale of stock now seems a strong possibility.

RURAL STEEL REQUIREMENTS CLIMB IN WEST — P. 77
Population growth, modern farming methods, combine to boost farm spending. Mills study market to assure share of the business. Storage bins, wire and dairy building all add to potential western steel needs.

IN METALWORKING

ENGINEERING & PRODUCTION

NEW PROCESS RECOVERS WASTE PRODUCTS—P. 91
Impurities in coke oven gas can now be recovered by a new process which uses waste pickle liquor for the washing treatment. The products normally considered waste are converted to marketable items. Ammonia, hydrogen sulphide and hydrogen cyanide are removed from coke oven gas, leaving it at city gas purity.

ACCURATE UNGROUND HOBS REDUCE COST — P. 94
Savings up to 18 pct on initial hob costs are achieved through the use of accurate unground hobs. Multiple-thread hob designs speed hobbing machine output on all parts. Hob sharpening costs are reduced by use of a high-speed sharpener with wet grinding equipment.

HOW TI BEHAVES AT HIGH TEMPERATURES—P. 96
Titanium's behavior at high temperatures has been of great interest to designers and materials engineers. In the air and land vehicles of tomorrow, high useful strength at high temperature will hold paramount importance. Here, based on extensive research, is the complete picture of how titanium alloys behave. Stability and uniformity of properties are generally good, and it has strength for long-term uses up to 1000°F.

SALT BATH LINE CUTS PROCESSING TIME—P. 100
Austempering of wrenches in a new line using electric salt bath furnaces and mechanized conveyors has reduced processing time from 10 to 1¼ hours. Treatment is in three steps—austenitize, quench and draw. Distortion and cracking are almost eliminated.

PRESSES DUPLICATE MACHINING ACCURACY—P. 102
A precision press setup turns out 250 steel stator rings every hour to extremely close tolerances. Parts are used in an automatic automobile transmission. Loading slides and chutes handle the parts in and out of the press dies for maximum safety. Some trimmed scrap is saved and subsequently used for other auto parts.

MARKETS & PRICES

FREIGHT CAR BUILDING DUE TO SPURT — P. 56
Conditions are right for a pickup in freight car building. Timing is a question but a break in the 2 year lag could come soon. Order backlogs of builders have been growing since third quarter of last year and January was an excellent month. Makers have their fingers crossed but admit there is good reason for a rail recovery.

STRUCTURAL FABRICATORS OPTIMISTIC — P. 59
Business is picking up for structural steel fabricators. Industry looks for further improvement in second half based on highway programs, other factors. Era of price cutting apparently has ended. Backlogs are increasing. Deliveries on wide flange structurals, light structurals, and plate are moving out.

STEEL DELIVERIES ARE LAGGING — P. 131
Slow delivery of steel is a growing problem with consumers. More users are turning to warehouses for emergency tonnages. This is a tip-off that warehouse business is on the way up. Additional products look strong for third quarter, and there will be carryover tonnages from second quarter for some items. Likelihood of conversion is becoming more certain as the market continues to tighten.

WAREHOUSES FILLING URGENT DEMANDS — P. 132
Distributors are starting to benefit from slow-down in mill promised delivery schedules. Some consumers are being forced to buy emergency tonnage from warehouse to supply needs. Hot-rolled, cold-sheets, hot-rolled bar head "priority" list.

PRESSURE ON FOR COPPER PRICE HIKE — P. 138
Sharp increase in copper price in London market (late last week it was quoted at the equivalent of 45¢ per lb) added pressure to forces tending to send domestic price upward.

NEXT WEEK:

FOUNDRY OFFERS TIPS ON SHELL MOLD CASTINGS
Accurate patterns and good pattern-making equipment are essential for good shell molded castings. Pattern-making temperatures of 450° to 500°F keep shells straight and castings accurate. Vibrating the material boxes during the investment cycle distributes resin-sand mix uniformly. Fine sand gives good finish.

WHO WERE STEEL INDUSTRY'S CUSTOMERS IN 1954?
Report on last year's steel buying breaks down consumption by major groups and tells what the trends were. The spectacular recovery of the automotive industry is discussed and the role this played in the steel industry's upturn is analyzed along with other developments.

HERE'S WHAT STANDARD PRESSED STEEL CO. THINKS OF

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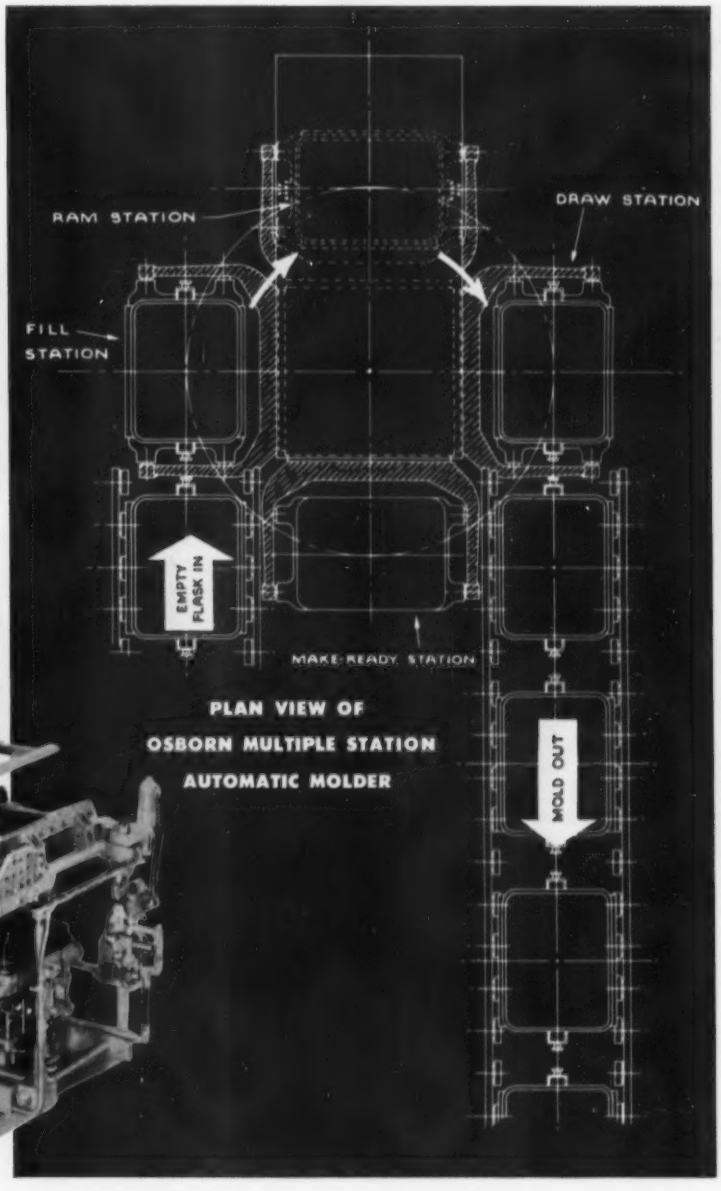
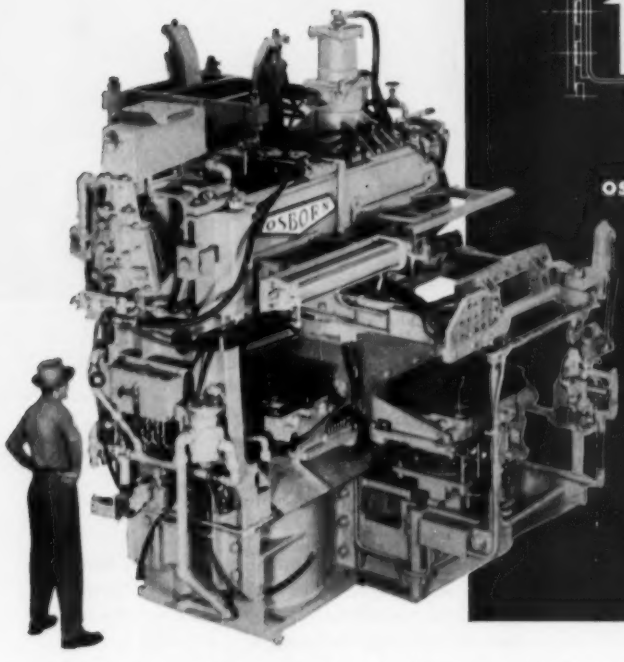


PLAN VIEW OF OSBORN MULTIPLE STATION AUTOMATIC MOLDER



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BPA NBP

Editorial:

Why Brake Borrowing?

◆ THE stock market investigation has started a lot of talk about borrowing. Who should do it; how much should it be and what good is it? Some believe the "little" people—and others—should not borrow too much; and if they buy stock they should put up 100 per cent margin.

That of course is silly. It would be suppression of basic rights and represent discrimination. Fortunately, top government officials and industrialists do not recommend such a financial straitjacket, whether they think it is needed or not. There is enough left unsaid though to speculate on just how far the government should go in trying to regulate the economy. No one wants a 1929 style crash. Yet no one in his right mind wants economic blue-noses tinkering with our future.

This isn't the time to say that the millenium has been reached. But it isn't the time to allow government or others to tamper too much with the "risk" rights of the people. There may be too much holier-than-thou attitude these days about credit, installment buying and mortgaging one's future.

Buying on time is not new—with companies or individuals. Most companies got started by borrowing. Future potential is always the handmaiden of risk and imagination. Someone has to take a chance and someone has to borrow. Both bring progress.

If all the women decided tomorrow to make their appliances last until they fell apart what would happen to a big segment of our industry?

If all the people who wanted a shiny new car decided that the old bus was good for another four years what would happen to the auto industry? And what would happen to those plants and employees directly connected with the auto industry?

If all the people who wanted a home of their own decided that they ought to double up and put up with others, what would happen to the building industry—and those working in it and for it?

If all industrialists decided that they didn't need expansion or new equipment and that the old way was always the best what would happen to you, to your company and to your life?

All these simple "ifs" have borrowing as their basis. But it is borrowing based on the sound knowledge that brains, spirit, risk, imagination and machinery will not only pay back the loan but will add some profit for all.

Tom Campbell

EDITOR

If you're part of the Farm Machinery Industry you should know about SHARON SPECIAL STEELS

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dear editor:

letters from readers

Testing Process

Sir:

The Feb. 3 issue of THE IRON AGE contained an article on testing captioned "Nondestructive Test Assures Leakproof Tubing," pp. 158-159, in which a so-called Farrowtest process is employed.

We would greatly appreciate knowing from what source we can obtain more detailed information regarding this method of tube inspection as well as the manufacturer of equipment utilized in conjunction with such process. *A. W. Herbenar, Staff Metallurgical Engineer, Hotpoint Co., Chicago.*

Further information on the Farrowtest process may be obtained from Republic Steel Corp., Steel & Tubes Div., Republic Bldg., Cleveland 1, Ohio.—Ed.

Fire Hazard

Sir:

The last item on your Mar. 3 Newsfront page discusses briefly the titanium fire hazard. We would greatly appreciate having whatever detailed information is available on this item as we are frequently asked about the hazard associated with titanium grinding chips. *L. P. Tarasov, Research & Development Dept., Norton Co., Worcester, Mass.*

Details on the titanium fire hazard may be obtained from American Welding & Mfg. Co., 190 Dietz Road, Warren, Ohio. —Ed.

Steel Labor Costs

Sir:

In the "Labor" section of the Feb. 24 issue of THE IRON AGE, there appeared an article on steel labor costs covering percentage changes in average hourly earnings, the wage costs per ton of steel produced, and the manhours worked per ton of steel during the period 1939-1954.

Is there similar basic information available on average earnings, average wage costs per ton of steel, and average manhours per ton in the mill segment of the steel industry?

We would greatly appreciate receiving any information you may have available on labor costs in this phase of the steel industry. *C. L. Hegtvedt, Manager of Commercial Research, Soulé Steel Co., San Francisco.*

The statistics covered in the steel labor article came from the American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y. Write them for the report on this subject which was contained in a special supplement to a 1953 issue of "Steel Facts."—Ed.

Abrasion Tester

Sir:

We are very much interested in the new abrasion tester for testing and measuring the abrasion resistance of porcelain enamel and other finishes and materials which was described in the Technical Briefs section of the Dec. 30, 1954 issue. Will you kindly advise us of the manufacturer and their address? *Nadine Hildebrandt, Librarian, Linde Air Products Co., Speedway Laboratory, Indianapolis.*

You may obtain this information from the Porcelain Enamel Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. —Ed.

Carbon Restoration

Sir:

Please send me 12 tear sheets of the article "Restore Surface Carbon in Sub-Critical and Over-Critical Anneal" by J. D. Armour which appeared in the Feb. 24 issue. We would like these for distribution to our sales and executive personnel. *G. Dressel, Advertising Dept., Surface Combustion Corp., Toledo, Ohio.*

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L-11

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Baker.
handling equipment

5GY-1

fatigue cracks

by William M. Coffey

Letters

How would you answer this letter?

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In these cases we say the same thing that General McAuliffe did. But maybe you have a better answer.

* * *

Incidentally, did you know that THE IRON AGE goes to over 1800 overseas subscribers in over 23 different countries? (None with our consent to Mr. Kuo-Kan's friends). Did you know that neither by thought, word or deed did we ask these people to subscribe—they asked us? Did you know that each one pays $15 to $25 per year, most pay $25? Did you know that four of them pay up to an extra $250 per year for air mail delivery? Now you know. Now you know the editorial power, reputation and strength throughout the world of America's National Metalworking Weekly. And aren't you glad you'll get a free copy of the 600-page "100 Years of Metalworking," coming in June, which commemorates the fact that we have been the national metalworking weekly for 100 years?

The Key Men

A little late for this, but we recommend to you the 1955 calendar put out by Chance Vought Aircraft, Dallas, Tex. Instead of girls, dogs or Cub Scouts, Chance Vought pictured each month with descriptions of the key men involved in aircraft manufacturing and for that matter all of metalworking. Here are two choice ones. We're just sorry you can't see the pictures that go with them. We'll print the others from time to time.

The Design Engineer—Deep in the jungles of integral calculus, where the smooth slip of the slide rule merges with the sharp staccato of uprooted hair, lives the Aircraft Engineer. Inately uncivilized, he dreams daily of ways to weaken the laws of physics. He slyly fingers his analog computer as he dwells on schemes for outmaneuvering the enemy and outwitting the Competition, other fierce tribes of the same breed.

The Toolmaker—From the great fertile area of Engineering come drawings for parts for which there are no known tools. To handle this deadlock, nature has provided the Toolmaker, an interesting type who clings to the motto, "The egg comes before the chicken." Handed a particularly juicy piece of Engineering, a Toolmaker will stand stockstill for a long time, apparently in a state of shock, and then run off to make a tool to make a tool to make a tool to make a part to make an airplane.

Puzzlers

Eustace, Angus and Butch wish to fill a 53 gallon jug, this time with water. Eustace will bring a pint of water at the end of every three minutes; Angus a quart every five minutes and Butch a gallon every seven minutes. How long will it take to fill the jug and who will pour the last of the water?

Better steels are the result of many things, not the least of which are addition agents. Although they may be small quantitatively, additives are extremely important qualitatively.

For many years, Foote Mineral Company has aided steel makers in materially improving both the quality of finished steel and the intermediate conditions involved in producing it. Manganese Sulphide and Rimex are two steel additives developed by Foote. Manganese Sulphide provides a more practical and economical means of introducing manganese and sulphur into free-machining steels. Rimex, by producing a more vigorous rimming action, improves the quality of rim steels while reducing production costs.

Foote's highly specialized metallurgical engineering group is eager to work with steel producers to find means to improve both the economies and characteristics of metals for industry.

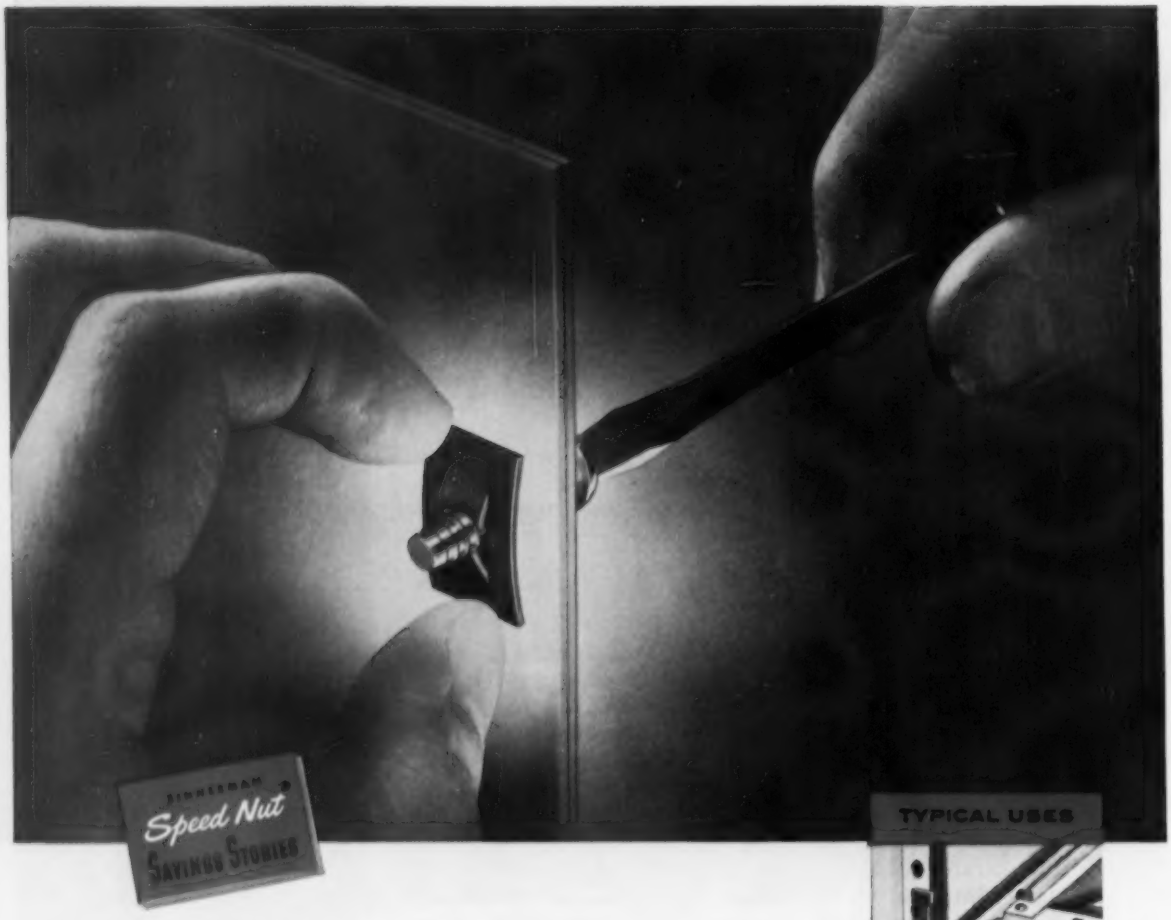
Write for information. Product data sheets will be sent upon request.

FOOTE MINERAL COMPANY

438 Eighteen W. Chelten Bldg.
Philadelphia 44, Pa.

RESEARCH AND DEVELOPMENT LABORATORIES:
Berwyn, Pa.

PLANTS: Exton, Pa.; Kings Mountain, N.C.; Sunbright, Va.



Savings that come from tough little Arches of Steel

This is a familiar sight on assembly lines today . . . a Tinnerman SPEED NUT being pulled down tight on its screw, never to shake loose from vibration. Yet easy to loosen at the proper time without worry about rust-frozen screw threads.

The secret lies in the arched base and prongs of the SPEED NUT. As the screw is tightened, the flexible SPEED NUT flattens, setting in action two distinct forces that lock for keeps. Yet a firm twist of the screwdriver is all that is needed to relieve those forces and loosen the fastener.

Savings in unit cost, in man-hours of application, in parts handling, are the important reasons why SPEED NUT brand fasteners are in service on your automobile, television set, home appliances and other assembled products. Write for "SPEED NUT Savings Stories", actual case histories of short cuts to assembly and production savings.

TINNERMAN PRODUCTS, INC. • BOX 6688, DEPT. 12, CLEVELAND 1, OHIO

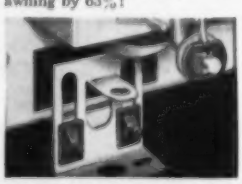
Canada: Dominion Fasteners, Ltd., Hamilton, Ontario. *Great Britain*: Simmonds Aerocessories, Ltd., Treforest, Wales. *France*: Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine). *Germany*: Hans Sickinger GmbH "MECANO", Lemgo-i-Lippe.

TINNERMAN Speed Nuts®
FASTEST THING IN FASTENINGS®

TYPICAL USES

Total cost of control-equipment enclosure reduced by 30% with "J" type SPEED NUTS!

Specially developed SPEED NUTS cut assembly costs of adjustable awning by 63%!



SPEED NUTS lower assembly costs 40% on casement-window air conditioner!

dates to remember

MARCH

NATIONAL ASSN. OF WASTE MATERIAL DEALERS, INC.—Annual convention, Mar. 20-22, The Conrad Hilton Hotel, Chicago. Association headquarters are at 271 Madison Ave., New York.

INTERNATIONAL ACETYLENE ASSN. —Annual spring convention, Mar. 22-24, Shamrock Hotel, Houston. Association headquarters are at 30 E. 42nd St., New York.

EXPOSITIONS

AMERICAN SOCIETY FOR METALS—Western Metal Exposition and Congress, Mar. 28-Apr. 1, Pan Pacific Auditorium, Los Angeles. Society headquarters are at 7201 Euclid Ave., Cleveland.

NATIONAL ASSN. OF PURCHASING AGENTS—Annual convention and Inform-A-Show, May 29-June 1, Waldorf-Astoria Hotel, New York. Association headquarters are at 11 Park Place, New York.

NATIONAL MACHINE TOOL BUILDERS' ASSN.—Machine Tool Show, Sept. 6-17, International Amphitheatre, Chicago. Association headquarters are at 2071 E. 102nd St., Cleveland.

AMERICAN HOT DIP GALVANIZERS ASSN., INC. — Annual meeting, Mar. 24-25, Brown Hotel, Louisville. Association headquarters are at 1506 First National Bank Bldg., Pittsburgh.

AMERICAN MACHINE TOOL DISTRIBUTORS' ASSN.—Spring meeting, Mar. 25-26, The Greenbrier, White Sulphur Springs, West Va. Association headquarters are at 1900 Arch St., Philadelphia.

STEEL SHIPPING CONTAINER INSTITUTE, INC.—Annual meeting, Mar. 29-31, Biltmore Hotel, Palm Beach, Fla. Institute headquarters are at 600 Fifth Ave., New York.

APRIL

NATIONAL FLUID POWER ASSN.—Annual spring meeting, Apr. 4-6, The Broadmoor Hotel, Colorado Springs, Colo. Association headquarters are at 1618 Orrington Ave., Evanston, Ill.

AMERICAN HARDWARE MANUFACTURERS ASSN.—Spring meeting, Apr. 10-14, Palm Beach, Fla. Association headquarters are at 342 Madison Ave., New York.

WIRE REINFORCEMENT INSTITUTE INC. — Spring meeting, Apr. 11, The Greenbrier Hotel, White Sulphur Springs, W. Va. Institute headquarters are at National Press Bldg., Washington, D. C.

CONCRETE REINFORCING STEEL INSTITUTE—Annual meeting Apr. 11-16, The Greenbrier Hotel, White Sulphur Springs, W. Va. Institute headquarters are at 38 S. Dearborn St., Chicago.

AMERICAN SOCIETY OF LUBRICATION ENGINEERS — Annual meeting and exhibit, Apr. 13-15, Sherman Hotel, Chicago. Society headquarters are at 84 E. Randolph St., Chicago.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Organization anniversary meeting, Apr. 16, Hoboken, N. J. Society headquarters are at 29 W. 39th St., New York.

PACKAGING MACHINERY MANUFACTURERS INSTITUTE — Semi-annual meeting, Apr. 16-17, Palmer House, Chicago. Institute headquarters are at 342 Madison Ave., New York.

COLD-ROLLED SHEETS

NEWEST PRODUCT OF

Newport Steel

Newport Steel completed another phase in its continuing program of expansion when early in 1955 cold-rolled sheets began to flow from a modern and entirely new cold-reduction mill. Customers of this 70-year-old company have waited long for these cold-rolled sheets—now offered for reasonably prompt delivery. With dependability of service and quality of product Newport Steel can serve you on the items listed on the left.

PRODUCTS OF NEWPORT STEEL

Cold-Rolled Sheets
Hot-Rolled Steel in Coil
Hot-Rolled Pickled Steel in Coil
Hot-Rolled Sheets
Hot-Rolled Pickled Sheets
Galvanized Sheets
Galvannealed Sheets
Colorbond Sheets
Electrical Sheets
Alloy Sheets and Plates
Electric Weld Line Pipe
Roofing and Siding
Eave Trough and Conductor Pipe
Culverts

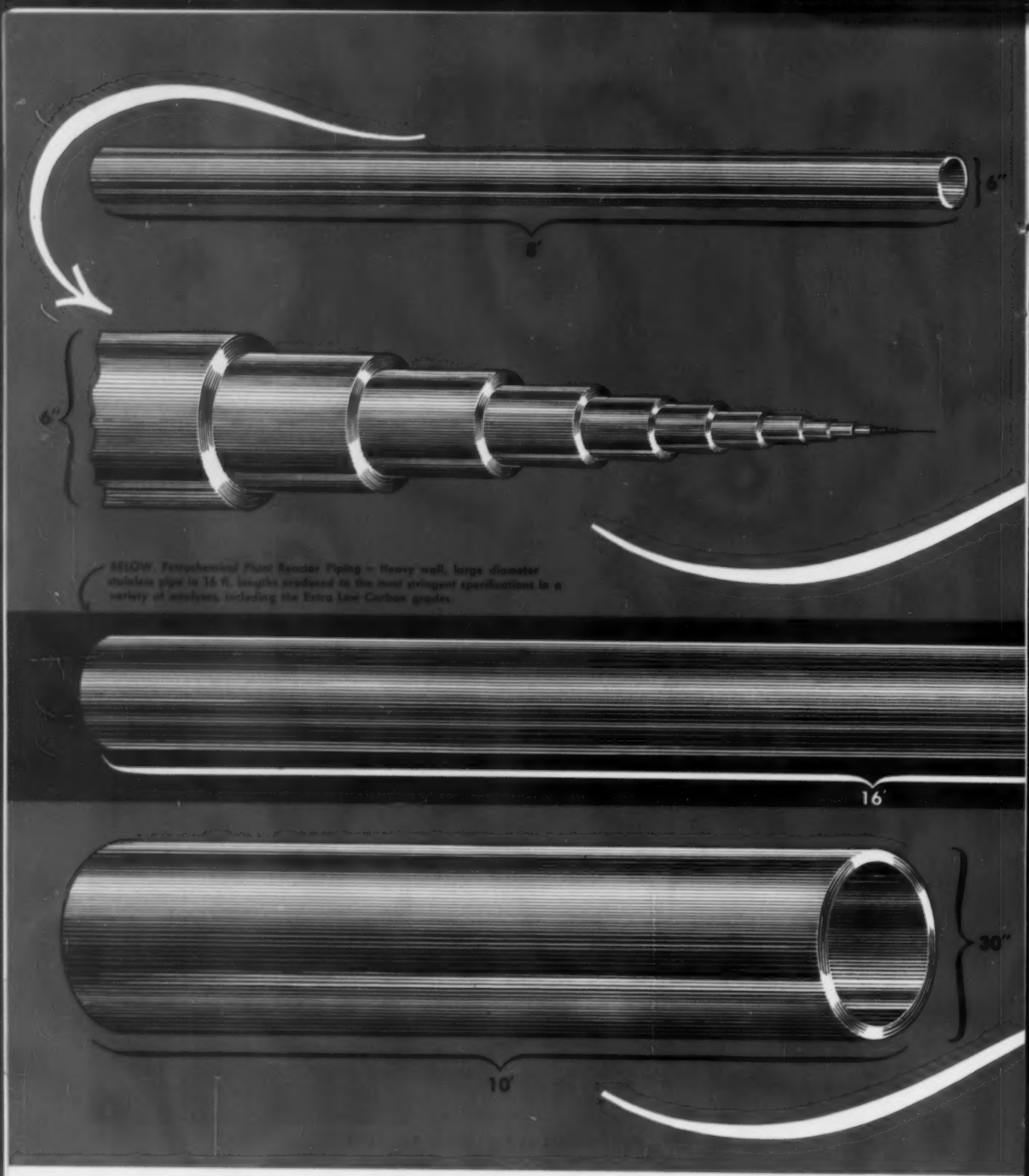
ECONOMICAL WATERAIL DELIVERY

Newport Steel is situated on the Mississippi-Ohio River system and the great Cincinnati rail hub. With the advantage of location, new river barge facilities and seven major railroads, Newport gives economical, dependable delivery to the entire area of the Middle West and South.

Newport Steel CORPORATION
NEWPORT, KENTUCKY

YOUR CONFIDENCE IS JUSTIFIED WHERE THIS FLAG FLIES

A SUBSIDIARY OF MERRITT-CHAPMAN & SCOTT CORPORATION



BELOW: Petrochemical Plant Reactor Piping — Heavy wall, large diameter stainless pipe in 16 ft. lengths produced to the most stringent specifications in a variety of analyses, including the Extra Low Carbon grades.

UNITED STATES PIPE & FOUNDRY CO.

Special Products Division

SPECIAL PRODUCTS DIVISION USP

BURLINGTON, NEW JERSEY

SALES OFFICES: LOS ANGELES, SAN FRANCISCO, CHICAGO, ST. LOUIS, CLEVELAND, DETROIT, PITTSBURGH, HARTFORD, BURLINGTON

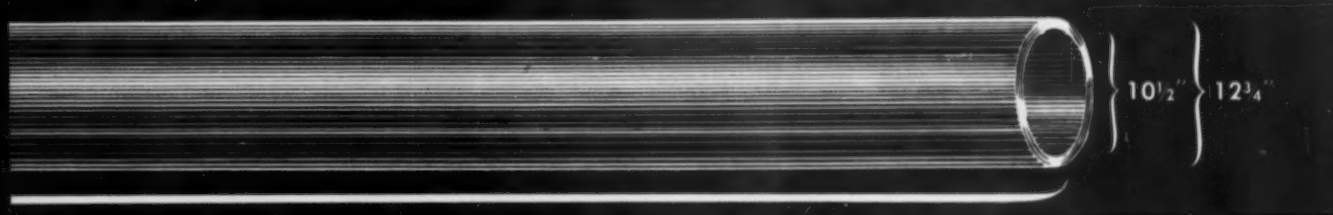
3 PROBLEMS
each different

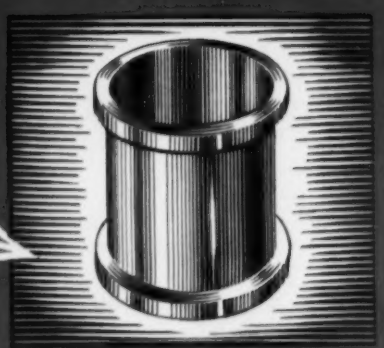
1 SOLUTION...
stainless steel
Centrifugal Castings

Hollow Billets for cold reducing into small diameter seamless tubing, even down to hypodermic needles—ultimate proof of metal soundness! Many so-called non-piercable grades of pipe and tubing can be hot or cold reduced from centrifugally cast billets.

Heavy Wall stainless steel pipe, centrifuge bowls, hollow billets for finely drawn hypodermic needle tubing . . .

These are among the many end uses for metal mold centrifugally cast cylindrical shapes. They are typical of the exacting, difficult service conditions to which this product is subjected. All three examples shown demonstrate the fundamental versatility of this manufacturing process—unequaled product soundness—from hypodermic needle stock subjected to the repeated stresses of cold reduction, to the centrifuge bowl spun





Centrifuge Bowl Shells produced from multiple length sections and machined to shape desired.

at 1800 RPM, to the petrochemical plant reactor piping that must pass hydrostatic pressure tests equal to 90% of the Yield Strength of the metal. These are the proving grounds of quality—of the ability to meet even the most exacting of product specifications.

We welcome your inquiries. For descriptive literature on the versatile metal mold process, write to United States Pipe and Foundry Company, Special Products Division, Burlington, N. J.

Study these advantages for your cylindrically-shaped products

- Reduced processing time and increased production.
- Design of parts to suit the specific job requirements by selecting the correct alloy—not the next best available alternate.
- Conservation of expensive metals and alloys—especially on tubular parts now produced from solid sections.

SIZE RANGE AND COMPOSITION FLEXIBILITY

Outside Diameter—4" to 36"

Wall Thickness—⅜" and up

Length—Up to 16' in the "as-cast" condition

Types of Stainless Cast—All Standard AISI and ACI grades of ferritic and austenitic stainless, including No. 20 Alloy, 17-4 P H, 17-7 P H and E.L.C. grades.

"GRIND-O-FLEX® wheels save us $10,000 per year"

writes D. R. Vreeland of Virginia Metal Products, Inc.

This unsolicited letter comes from a man who is glad he discovered Grind-O-Flex. If you have a difficult deburring, light-grinding or polishing job on flat or contoured surfaces, it will pay you to investigate Grind-O-Flex, too, and find out how you can save finishing costs in your shop.

CABLE "VAMPCO, ORANGE, VA"
TELEPHONE ORANGE 2001

VIRGINIA METAL PRODUCTS, INC.

MOBILWALLS • CONVEYORS • VERTICAL FILES • BOOKSTACKS • STEEL DOORS AND FRAMES

Home Office and Plant, Orange, Virginia

December 23, 1954

Merit Products, Inc.
4023 Irving Place
Culver City, California

Gentlemen:

I am sure you are interested to know that the use of Grind-O-Flex wheels is saving us over $10,000 per year in direct labor cost. We are using these units in our specialties shop where they can't be beat for cleaning off welds on our Mobilwall partitions, library bookstacks and Orange doors and frames.

This method has also given us double insurance that we will meet the high standards of our workmanship.

Very truly yours,
VIRGINIA METAL PRODUCTS, INC.

D. R. Vreeland
Manager, Industrial Engineering

Mounted on a motor shaft, Grind-O-Flex is used for finishing pillowblock castings while removing flash and blemishes.

Deburring and cleaning up rough-cut edges with no possible chance of digging into soft metal or loading up.

Very light in weight, three wheels are easily handled when mounted in multiple. Arbors are furnished for 1-, 2-, 3-, and 4-wheel mounts.

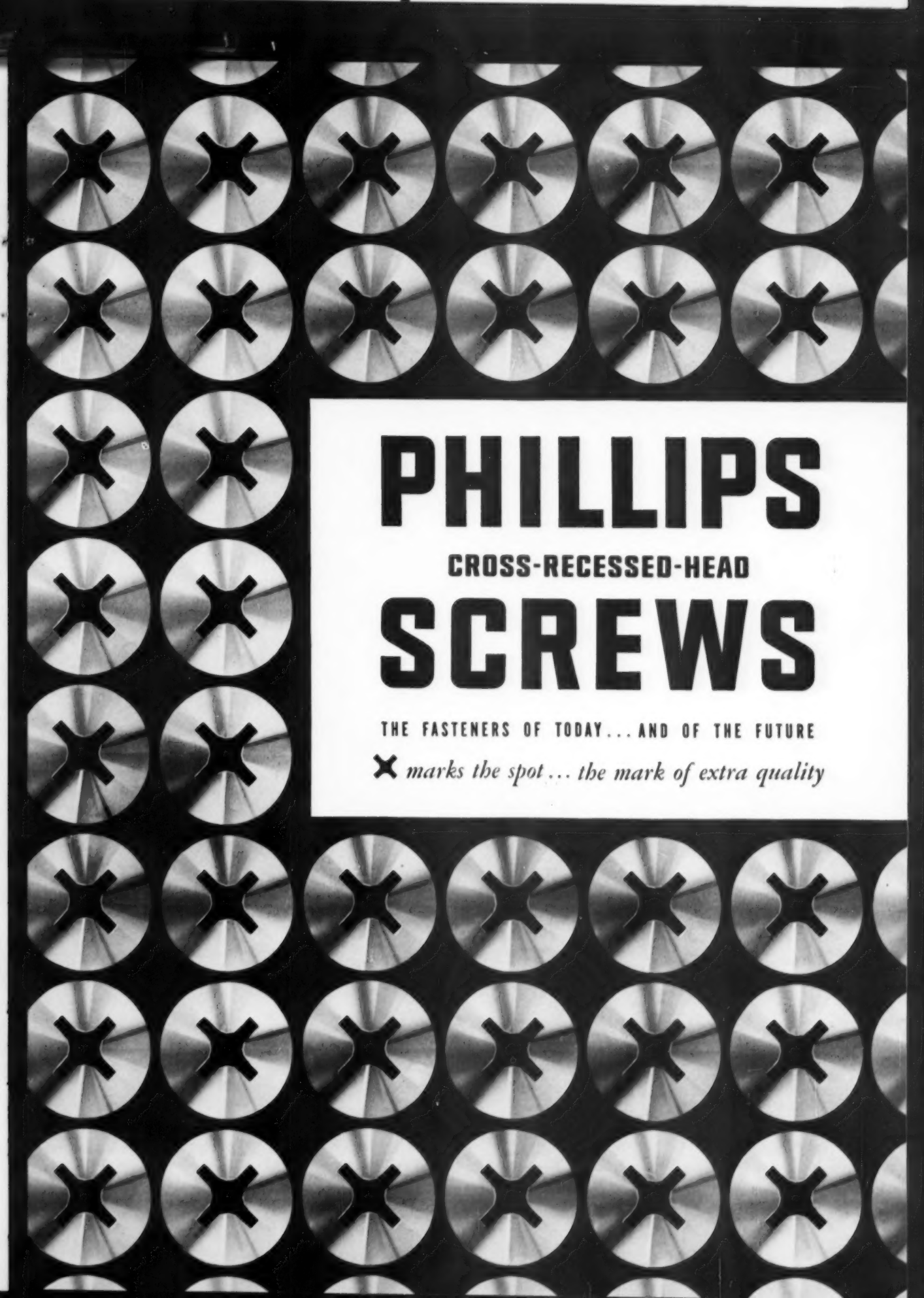
SAND-O-FLEX for greater flexibility

For lighter grinding and greater flexibility on contoured surfaces, use Sand-O-Flex, the brush-backed abrasive wheel. Available in four models, refill abrasive cartridges furnished in a variety of grits. Fits your present power tools—stationary or portable. Write for catalog.

There is absolutely nothing else like Grind-O-Flex for removing excess material and smoothing rough contoured surfaces on metals, plastics, and for satin finishing stainless steel. It consists of hundreds of "leaves" of abrasive cloth sealed into a core. As the wheel spins it presents a flexible, continuous abrasive surface to the work piece. It is impossible to dig into the metal or to "flat" radii. Needs no special equipment or set-ups; simply attach it to any rotating spindle (motor shaft, lathe, drill press, flexible shaft, portable electric drill, etc.). Available in 40, 60, 80, 120, 180, 240 aluminum oxide. Mounting flanges and arbors are furnished. Write for catalog price sheet showing various sizes.

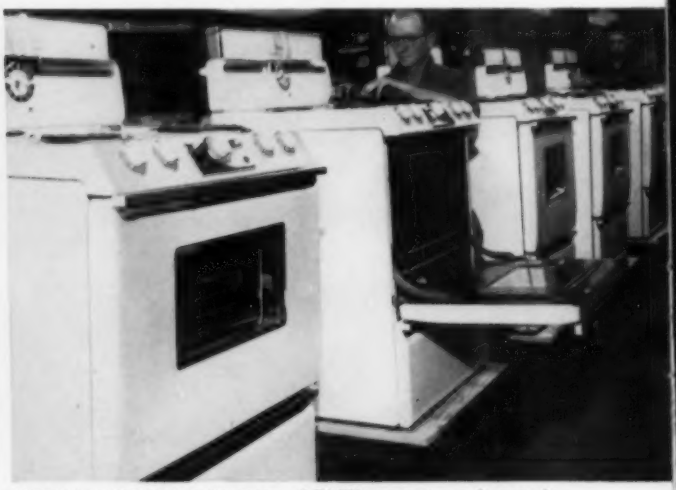
merit PRODUCTS, INC.

4023 Irving Place, Culver City, California


PHILLIPS
CROSS-RECESSED-HEAD
SCREWS
THE FASTENERS OF TODAY... AND OF THE FUTURE
marks the spot... the mark of extra quality

"TERRIFIC TIME SAVERS", says Bryant Heater Company foreman,of Phillips "Sems" used in blower unit sub-assemblies. "We save up to 1½ hours per day with these screws and get much better fastening."

VITAL TO FLEET OF AMERICA, INC., are the Phillips screws used in assembling "Fleetlite" aluminum windows. "Phillips screws," reports the plant manager, "are one factor enabling us to promote the low cost of our units that results from engineered production methods, ease of assembly and low maintenance. We would never use any other type of screw."



TAPPAN RANGES USE MILLIONS of Phillips screws each year in assemblies. "I can't say too much about the fastening qualities of Phillips screws," states a Tappan official. "In fact, I don't know of a single case where they've failed us. We will continue to use them in all future designs."

THEY ALL CUT PRODUCTION TIME AND COSTS

... with Phillips Cross-Recessed-Head Screws

MANY PRODUCTION ADVANTAGES for Tracy kitchen cabinets derive from Phillips screws. The Tracy general manager says, "Our use of Phillips screws has eliminated costly refinishing due to gouging, enables us to train assembly personnel much faster, makes possible our invisible hinge design and helps produce stronger, better looking cabinets."

IN ALL OTIS ELEVATOR SWITCHES. According to an Otis consulting engineer, "Phillips cross-recessed-head screws have rewarded us with greatly increased production, decreased assembly time, a neater installation, tighter and more positive contact, and more positive centering of the driving bits."

• MANUFACTURERS OF • PHILLIPS CROSS-RECESSED-HEAD SCREWS •

THE FASTENERS OF TODAY...
AND OF THE FUTURE

X marks the spot
the mark of extra quality

TITAN THERM-O-DIAL HEATERS COST LESS, thanks in part to Phillips screws. A Titan executive states, "With Phillips screws we can utilize a full mass-production assembly, reduce damage and tool replacement and produce more attractive, lower priced items through decreased production time."

Look to these manufacturers for X-tra quality Phillips Cross-Recessed-Head Screws

ALLMETAL SCREW PRODUCTS COMPANY, INC.
821 Stewart Avenue, Garden City,
Long Island, New York

AMERICAN SCREW COMPANY
Willimantic, Connecticut

ATLANTIC SCREW WORKS, INC.
85 Charter Oak Avenue,
Hartford 1, Connecticut

THE BLAKE & JOHNSON CO.
Waterville 14, Connecticut

CENTRAL SCREW COMPANY
3501 Shields Avenue,
Chicago 9, Illinois

CONTINENTAL SCREW COMPANY
New Bedford, Massachusetts

THE EAGLE LOCK COMPANY
Terryville, Connecticut

ELCO TOOL AND SCREW CORPORATION
Rockford, Illinois

GREAT LAKES SCREW CORP.
13631-51 So. Halsted Street,
Chicago 27, Illinois

THE H. M. HARPER COMPANY
Morton Grove, Illinois

THE LAMSON & SESSIONS COMPANY
1971 West 85th Street,
Cleveland 2, Ohio

NATIONAL LOCK COMPANY
Rockford, Illinois

THE NATIONAL SCREW & MANUFACTURING COMPANY
2440 East 75th Street,
Cleveland 4, Ohio

PARKER-KALON Division General American Transportation Corporation
200 Varick Street,
New York 14, N. Y.

PHEOLL MANUFACTURING CO.
5700 Roosevelt Road,
Chicago 50, Illinois

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

SCOVILL MANUFACTURING COMPANY
Waterville 14, Connecticut

SHAKEPROOF Division Illinois Tool Works
2501 North Keeler Avenue,
Chicago 39, Illinois

THE SOUTHINGTON HDWE. MFG. COMPANY
Southington, Connecticut

STERLING BOLT COMPANY
363-405 West Erie Street,
Chicago 10, Illinois

UNIVERSAL SCREW COMPANY
127 South Green St.,
Chicago 7, Illinois

WALES-BEECH CORPORATION
2240 Fifteenth Street,
Rockford, Illinois

4.5.15 Printed in U.S.A.

YOU CAN COUNT ON CONTINENTAL FOR EVERY FASTENER NEED!

Phillips "*Bits–Holders–Screws*" are Exclusive with Continental!

Here's how they can boost your output

Only the Continental Screw Co. offers this three-way fastening combination to increase your output. Phillips *bits, holders, and screws* now make power-driving really practical—even on your finished parts.

The Continental record speaks for itself. Continental Phillips Bits have driven as many as 1,000,000 screws without replacement. They average from 2 to 4 times longer life than other bits, and have cut fastening costs as much as 50%.

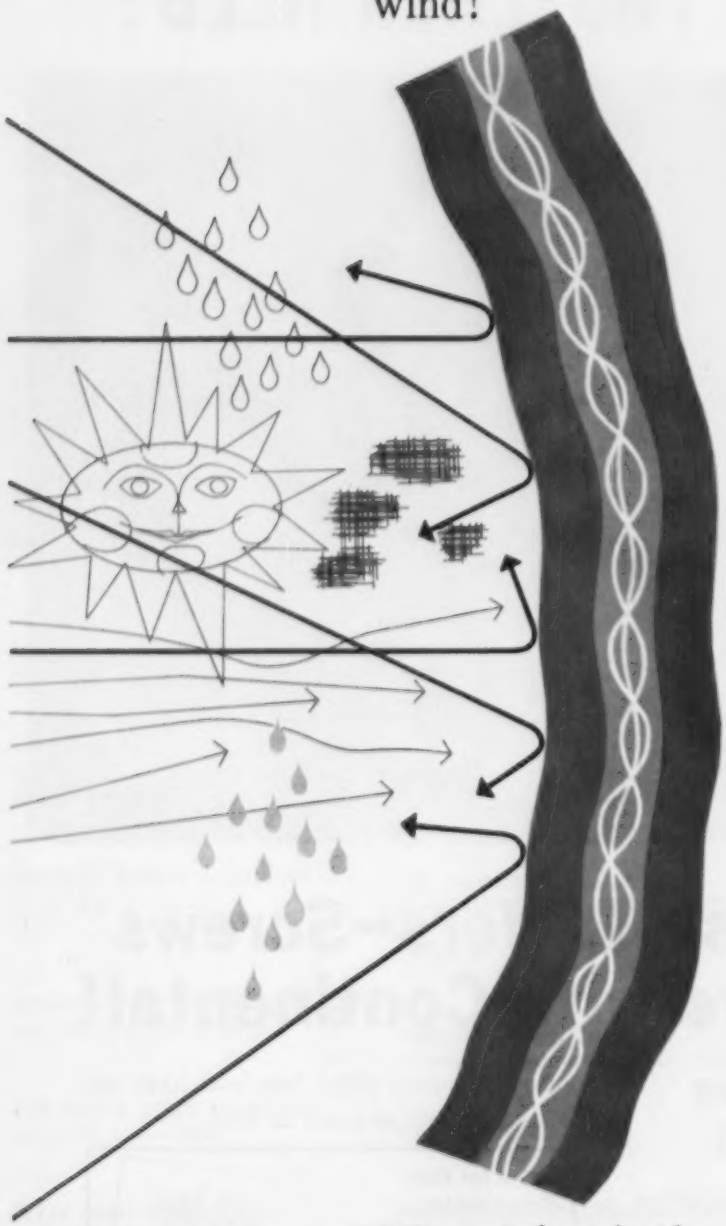
Send for this free booklet on Hy-Pro Phillips Insert Bits and Holders. Write to Continental Screw Co. New Bedford, Mass.

Continental Screw Co.

Manufacturers of Holtite Fastenings

NEW BEDFORD, MASSACHUSETTS, U. S. A.

this wrap-around shield keeps out more than wind!



This is a cross section of a new paper developed by Cromwell as a wrap for sheet steel shipped by barge. Only Cromwell could "build-in" this wide range of protective abilities in a single sheet...

EXTRA-WATERPROOF
OIL RESISTANT
EXTRA-STRONG
SCRATCHPROOF
FLEXIBLE
VOLATILE
CORROSION INHIBITION

This new Cromwell sheet consists of two heavyweight sheets of kraft, blond laminated for high waterproofness, oil resistance and moistureproofness. It is reinforced with just enough specially selected glass fibers to provide strength and prevent a tear, but not enough to injure flexibility. The entire structure is embossed for flexibility. One wall of kraft is treated with Ferro-Pak VCI to prevent rust. Printed for brand or company identification.

A versatile paper like this may be just what you've been looking for. But whatever your needs, Cromwell "Paper Engineering" can give you the bag, cover or liner with the *right* combination of protective qualities. Write us about your problems.

See us in Booth 213 at the AMA Packaging Exposition in Chicago, April 18-21.

paper engineering *by*

CROMWELL

Cromwell PAPER COMPANY • 4803 South Whipple Street • Chicago 32, Illinois

MANUFACTURERS OF: Papers (Impregnated • Coated • Laminated Reinforced • Flexible) Bags • Sacks • Liners • Covers • (Single and multiwall construction, using all types of material to carry, cover or protect all types of products.)

Built right – Sold right

WARNER & SWASEY MACHINE TOOLS have established enviable records for high productivity, low maintenance and minimum downtime. They've *proved* their dependability – holding their accuracy for years after they have paid for themselves. They're *built right!*

Warner & Swasey's principle of design plays an important role in this success. Each model is *individually designed*—from the floor up—to handle a *specific range of work*. Machine handling time is thus minimized.

Skilled craftsmen, working to exacting Warner & Swasey standards, combine the most modern machines and processes with certain time-honored hand techniques—so necessary to insure the traditional Warner & Swasey accuracy.

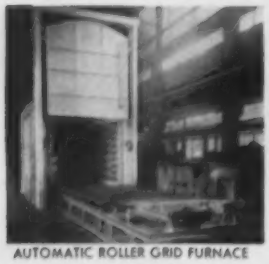
And Warner & Swaseys are *sold right!* By turning specialists who follow a rigid Warner & Swasey policy—that they recommend and sell a machine *only* when it completely fulfills the requirements of your particular work.

These turning specialists are also at your service long *after* the order is written. Your nearest resident Field Representative, one of 47 located throughout the country, is quickly available to you. He's ready to lend his training and experience to help you *maintain* the high productivity of the Warner & Swaseys in your plant.

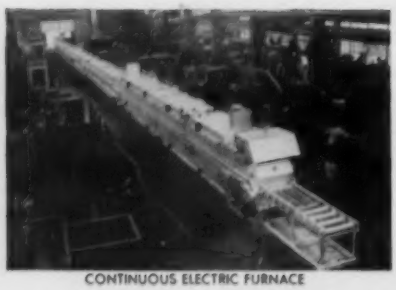
So whatever your turning needs . . . whether it's a machine for a specific job, or if you're looking for greater production through modernization—call in your nearest Warner & Swasey Field Representative.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

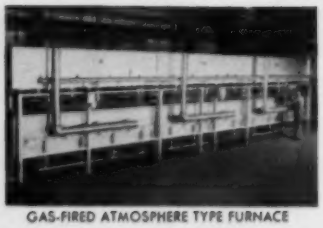
YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY



AUTOMATIC ROLLER GRID FURNACE



CONTINUOUS ELECTRIC FURNACE

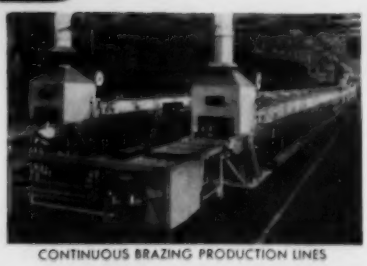


GAS-FIRED ATMOSPHERE TYPE FURNACE

BIG ONES

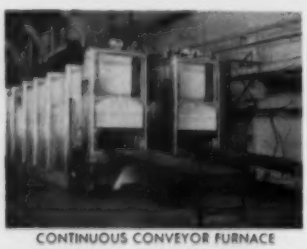
AUTOMATIC ROTARY HEARTH FURNACE

ALUMINUM BILLET HEATER

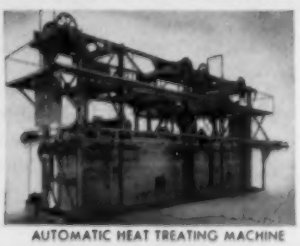


CONTINUOUS BRAZING PRODUCTION LINES

CONTINUOUS ROTARY RETORT FURNACE



CONTINUOUS CONVEYOR FURNACE



AUTOMATIC HEAT TREATING MACHINE

CONTINUOUS VITREOUS ENAMELING LINE

Visit Lindberg at ASTE Show, Booth 666 and at ASM Western Metal Exposition, Booth 334.

. . . all field-erected by Lindberg

Maybe you haven't heard the news. Lindberg is now set up to field-erect any type of industrial heating or processing installation. Here are just a few of the large field-erected installations already put up by Lindberg. More are being built right now.

You get a complete package deal from Lindberg. Expert engineers consult with you and analyze your needs. Then they plan and design an installation to meet your specific requirements, whether you need a single furnace or a complete production line. And Lindberg will build it for you, right in your own plant.

To get on-the-spot service from an expert Lindberg engineer, just call your nearest Lindberg Field Office (you'll find the number in the classified section of your phone book, or in the Trade Directories).

LINDBERG INDUSTRIAL

LINDBERG INDUSTRIAL CORPORATION

Chicago Plant: 2321 West Hubbard Street, Chicago, Illinois

Field Offices in principal cities.

Los Angeles Plant: 11937 Regentview Avenue, at Downey, California

Associate Companies: Lindberg Engineering Company, Chicago • EFCO-Lindberg, Ltd., Montreal • Lindberg Italiana, Milan, Italy

Another Unusual Application of Gardner Abrasive Discs

Selecting an abrasive for grinding rough concrete floors was a problem recently faced by Whiteman Manufacturing Company of Los Angeles. Their line of cement floor surfacing machines must hold up under conditions of heavy stock removal.

The Gardner #16 grain, deep corrugated YELLOW-RIM WIRE-LOKT disc proved the solution to this problem by providing the required combination of heavy cutting plus long life.

Solving problems like this is the job of the Gardner Abrasive Engineer. Call him for help on your grinding jobs. Gardner Machine Company, 410 Gardner Street, Beloit, Wisconsin, U.S.A.

123A

GARDNER

abrasive discs

Revolutionary way to grind metal sheets.....

This Hill-Acme Double Housing Abrasive Belt Taper Grinding Machine, with its 84" wide x 40' long hydraulically operated table, was specially designed and built for these operations by the HILL ACME COMPANY, *Cleveland, Ohio.*

...with the Hill Acme precision grinding and polishing machine and Behr-Manning abrasive belts!

HERE'S ANOTHER MILESTONE in the swift advance of "industry's fastest developing production tool" — abrasive belts. The job is to grind and finish aluminum aircraft wing sections, so large that they are handled by a sheet loading device equipped with vacuum cups, and are then firmly held on the table of the machine by vacuum chuck. The belt itself is actually *86" wide*. Its exceptional size requires a special fixture to mount it on to the rolls of the machine. To make this big belt, several sections are joined, with all seams on the bias. Only meticulous precision methods and equipment, available at BEHR-MANNING, could successfully build these huge belts, assuring their constant uniformity.

Whether you're finishing big surfaces like this, or intricate contours requiring a belt only ¼" wide, check with your nearest BEHR-MANNING Application Clinic for the latest time-saving method. See your local BEHR-MANNING Representative, or write direct to Behr-Manning, Troy, N. Y., Dept. IA-3.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

BEHR-MANNING
division of NORTON Company
▲ COATED ABRASIVES ▲ SHARPENING STONES ▲ PRESSURE-SENSITIVE TAPES

The big belt being transferred to the machine. Note the bias seams in the built-up belt, avoiding any resulting marking on the work. When in operation, the belt is enclosed, as a heavy flow of coolant is used.

For the newest in coated abrasives ...watch BEHR-MANNING!

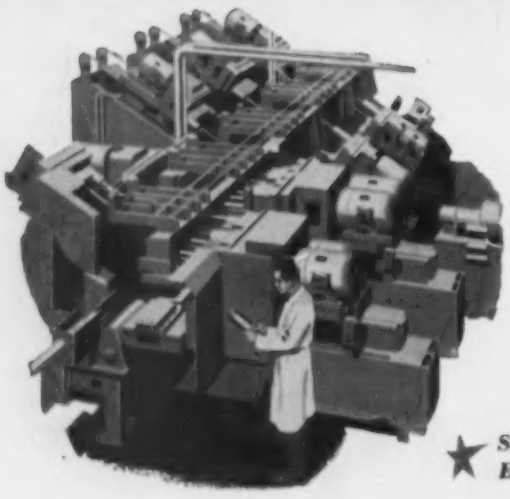
G-3

Wherever you are . . .
whatever your job . . . you'll find

Delco Electric Motors

and

Delco Service

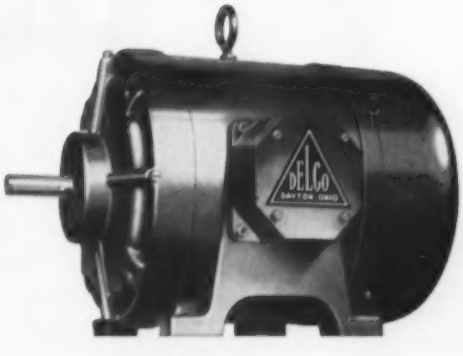


Wherever you are and whatever your power needs, you'll always find Delco Electric Motors and Delco service as near as your telephone.

Delco Electric Motors are available the world over through Delco motor distributors. And reliable Delco parts and service facilities are nearby, wherever Delco motors go.

Delco Electric Motors are backed by unsurpassed research facilities and years of design and production experience . . . manufactured by the most modern methods. Every motor that carries

★ *See Delco Electric Motor advertising in The Saturday Evening Post for the story of the full Delco Motor line.*



the Delco nameplate is built to one rigid standard of quality, and is thoroughly tested before it leaves our plant. What's more, our Delco engineers will work with your engineers to find the motor best for your job. These are the reasons why Delco is preferred by industry ... why Delco is best for you.

Whether you require small integral electric motors or totally enclosed fan-cooled giants, you can count on Delco for peak performance and consistent dependability.

GM GENERAL MOTORS DELCO DAYTON, OHIO

DELCO *Electric* MOTORS

DELCO PRODUCTS, DIVISION OF GENERAL MOTORS, DAYTON, OHIO

Proved best by Performance!

-in the package

-in product performance

P-K® means OK

and planned savings pay off

PARKER-KALON®

P-K means OK right down the line. *When you buy* P-K Socket Screws, it means OK for guaranteed quality and tolerance gaged to highest standards. *On the job,* it means OK for advanced design features that speed the job, save errors, like SIZE-MARK on P-K Cap Screws. *When you sell* your product, it means OK for lasting strength, dependable performance proved in millions of assemblies.

Get samples, information from your P-K Distributor, or write Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

IN STOCK . . . see your nearby

P-K Socket Screw Distributor

HOW TO BUY CONVEYOR BELTS

and get...
MORE USE PER DOLLAR
where
SPECIAL ENGINEERING
is needed

Look for a make of belt backed by experienced, specialized engineering service.

Selecting the right conveyor belt to solve a special problem begins with selecting the right representative . . . one who will take interest in your particular belt needs and refer your problems to his factory if engineering help is required. Where a company makes a wide selection of conveyor belts for many applications, the representative can often recommend a feature construction to meet your job requirements. Where your problem is unique, that company backs its field men with custom engineering and comes up with a recommendation to meet your specific operating conditions.

Choose the company that offers *complete* belt engineering service . . . the source of supply that maintains close contact between factory and field.

RAYBESTOS-MANHATTAN CONVEYOR BELT ENGINEERING

A leading steel mill, faced with handling hot sintered ore without an insulating layer of "fines", had numerous belt failures due to charring.

An R/M representative called in a factory engineer. A new custom-engineered R/M conveyor belt with special cover now saves hundreds of dollars a year at the mill.

and . . . where hot ash and clinker was wearing out a conveyor belt every month at a Michigan cement plant, an R/M field man was able to furnish a specially engineered Homocord Belt which has outlived the best previous belt four times over.

and . . . special, "chevron cleated" conveyor belt was developed by R/M, as a result of a field representative request, to replace a smooth surfaced belt unable to carry wet iron ore up a mine slope without costly spillage.

These are just a few of many instances where R/M engineering service has solved conveyor belt problems. In other cases, special job requirements have been met with R/M's exclusive constructions such as extra-flexible Ray-Man "F" . . . extra-cushioned Homocord for shock-loading . . . and Ray-Man Tension-Master for extra-high tensions and long lifts.

Let an R/M representative show you why R/M engineering makes R/M Conveyor Belts last much longer . . . give you "More Use per Dollar".

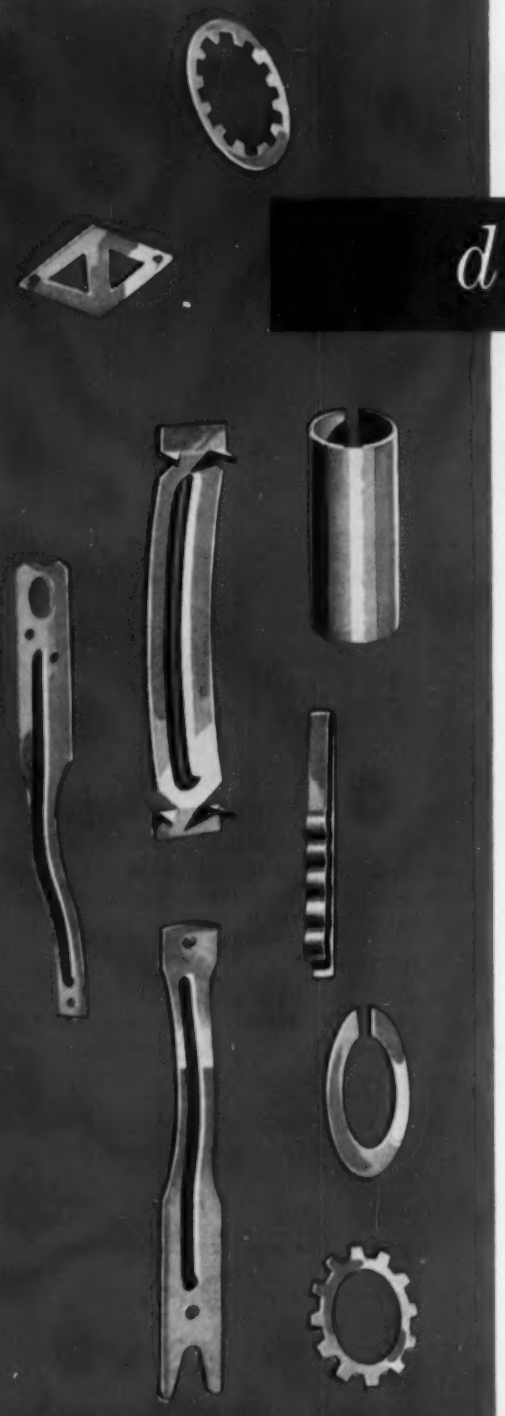
RM-600-A8

RM

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls



dependable!

WEIRTON

high carbon strip
cold-rolled spring steel

for high-speed blanking or forming

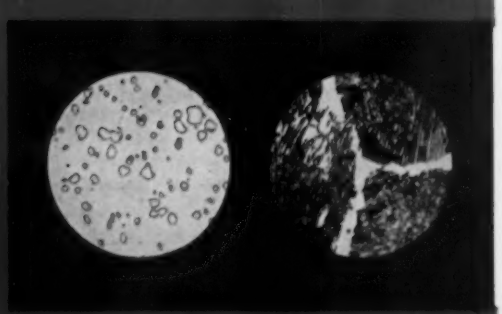
Where high fatigue-resistance is a principal factor, Weirton cold-rolled spring steel furnishes high carbon strip in the consistent uniformity necessary to meet the most exacting requirements of a wide variety of products. The close manufacturing control featured at Weirton results in several unique and highly desirable qualities—such as accurate response to heat treatment . . . uniformity of gauge and width . . . uniform chemical and physical properties . . . exact consistency of grain structure . . . controlled decarburization limits.

Pearlitic and spheroidized structures are available with desired chemical analyses and for specific heat treating and hardness. When you call Weirton you call for easier blanking and cold forming. And, at Weirton, you get what you call for.

WEIRTON STEEL COMPANY

Weirton, West Virginia

NATIONAL STEEL CORPORATION



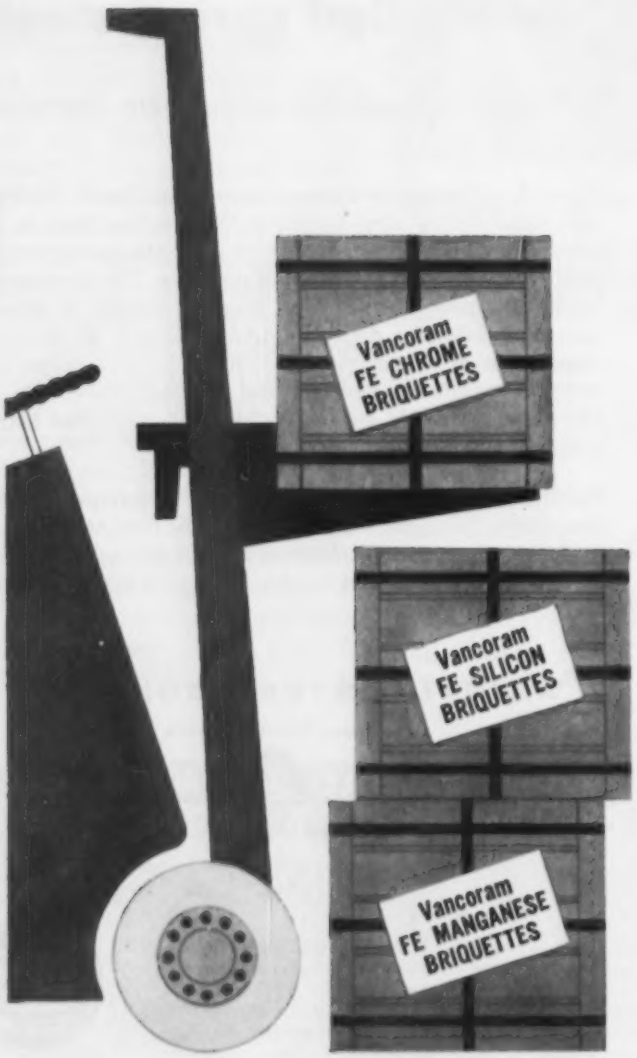
The photomicrograph on the left illustrates Weirton high carbon strip that has been spheroidized and annealed—soft and ductile—ideal for cold-forming operations. The one on the right shows the pearlitic steel structure, temper-rolled in controlled hardness and strength for clean, economical blanking procedure.

WEIRTON STEEL COMPANY

Save 5 ways with pallet boxed shipments

VANCORAM BRAND

FERROCHROMIUM, FERROSILICON, FERROMANGANESE BRIQUETTES



Now— You can save time and money through...

1. EASIER HANDLING—Pallet boxes for Vancoram Briquettes and ferro alloys have been especially designed for safe, easy handling. Constructed of sturdy hard wood and tied with strong steel strapping—the chance of breakage is minimized.

2. MORE EFFICIENT STORAGE—The design and strength of Vancoram Pallet boxes permit safe multiple stacking indoors or out, which may not be feasible with more flimsy construction.

3. READY IDENTIFICATION — Pallet boxes of Vancoram Briquettes and ferro alloys are easily identified by the same plain marking and color-coding identification labels used on Vancoram Drums.

4. LESS CHANCE OF CONTAMINATION—Material confined to its own container rather than unwieldly bulk handling.

5. FASTER INVENTORY — Has the advantages of packed shipment in easy, quick inventory.

Besides briquettes, most other Vancoram ferro alloys are available in economical, easily-handled pallet boxes — another Vancoram service to you.

MAIL COUPON TODAY!

MP-1

VANADIUM CORPORATION OF AMERICA
420 Lexington Ave., New York 17, N. Y.

GENTLEMEN: Please send me a copy of your color brochure giving a complete description of the advantages of Vancoram Palletized Shipments.

Name_____

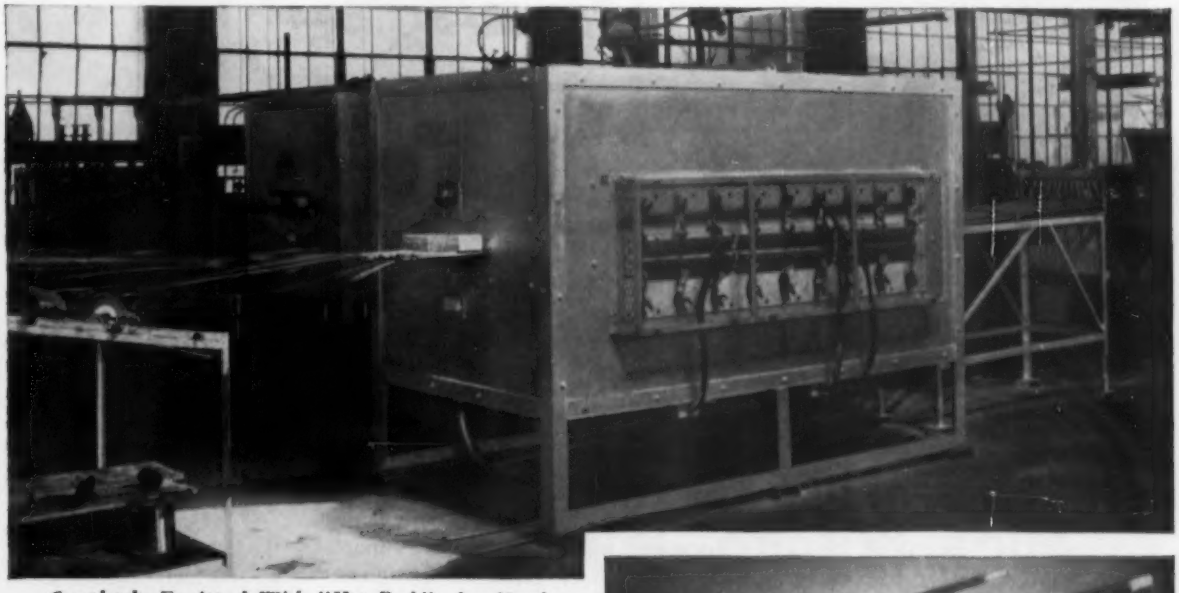
Position_____

Company_____

Address_____

City_____ State_____

More proof that "HOT RODS" last 3 times longer



Completely Equipped With "Hot Rods" after Norton CRYSTOLON heating elements proved their ability to outlast others 3 to 1. This electric furnace is one of a battery operated by the Alloy Metal Wire Division of H. K. Porter Company, Inc. of Prospect Park, Pa., for bright annealing alloy wire at 2150F. Heating elements operate in an air atmosphere, while the wire passes through tubes containing a controlled split-ammonia atmosphere. These furnaces idle at 1700F-1750F on weekends and holidays, so element service is continuous.

Norton CRYSTOLON Heating Elements, or "Hot Rods", are a typical Norton ℞ — an expertly engineered refractory prescription for greater efficiency and economy in electric kiln and furnace operation. Made of self-bonded silicon carbide, each rod has a central hot zone and cold ends. Aluminum-sprayed tips and metal-impregnated ends minimize resistance and power loss. Available in standard sizes.

Alloy Metal Wire Division H. K. Porter Company, Inc. converts to CRYSTOLON heating elements after tests prove superiority of latest Norton ℞*

Like many another new user of "Hot Rods" the Alloy Metal Wire Division of H. K. Porter Company, Inc. found that these Norton CRYSTOLON heating elements last much longer. Here is a summary of the tests responsible for this company's decision to make a complete change-over to "Hot Rods."

Electric furnaces at the company's Prospect Park plant are used for bright annealing alloy wire at 2150F. Previous heating elements had given approximately 4 to 6 months service with 3,048 hours as the best recorded service life. Then, in a furnace completely equipped with "Hot Rods" the Norton elements averaged 18 months of continuous service — or over 13,000 hours per element. Once again "Hot Rods" proved their ability to outlast competitive elements — by better than 3 to 1!

But that's not the whole economy-story. The much longer life of "Hot Rods" also means savings in element costs, because fewer "Hot Rods" are needed — *plus* reduced maintenance, due to less frequent changing — *plus* fewer changes in voltage taps — *plus* a smoother production flow.

Put these advantages to work for YOU

in your own electric furnaces or kilns. The big illustrated booklet, *Norton Heating Elements*, gives complete details on how this proved Norton ℞ cuts operating and maintenance costs. For your copy, write to NORTON COMPANY, 202 New Bond Street, Worcester 6, Mass.

NORTON

REFRACTORIES

Engineered... ℞... Prescribed

Making better products... to make your products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

The issue of The Iron Age A Chilton Publication you'll save for the next 100 years...

. . . because The Iron Age's "100 Years of Metalworking" will be the most comprehensive issue of a magazine ever published on metalworking.

In this 100th year commemorative issue you'll find a review of the past, a discussion of the present and—most important—a prediction of the future of every phase of the giant metalworking industry. The list on this page gives you just the bare skeleton of this giant editorial enterprise.

"100 Years of Metalworking" will be a treasured collector's item. And it will serve as a planning guide for future industry expansion and future technological development. The publication date is Mid-June. You'll receive it as part of your regular subscription to The Iron Age.

Watch for "100 Years of Metalworking" — Mid-June, 1955

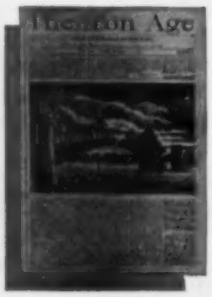
- Iron Age History
- Atomic Energy
- Casting
- Heat Treating
- Iron and Steel
- Machine Tools
- Materials Handling
- Metal Finishing
- Nonferrous Metals
- Press Work
- Refractories and Ceramics
- Testing, Inspection and Instrumentation
- Welding, Brazing and Joining
- Prices and Production
- Rebuilt Machinery

WANTED

The earliest issues of The Iron Age —first published in 1855 —still in existence in this country.

$500.00 reward will be paid for the issue you discover and submit with the oldest dateline (send photostats or facsimiles—actual issues only if you are a contender). The issue shown at right is one of the earliest copies still on file in The Iron Age's office. Older copies may have similar characteristics.

For complete details of this reward write for set of rules governing entries.



The Iron Age A Chilton Publication

Old Issue Information • 100 East 42nd Street, New York 17

ALLOY STEELS PAY OFF
60 fully documented case histories
Facts on maximum pay load
Facts on lower operating costs
Facts on lower corrosion rate
Facts on toughness, wear, strength

CLIMAX MOLYBDENUM COMPANY, Dept. 2
500 Fifth Avenue, New York 36, N. Y.

Please send me the 208-page handbook
"Alloy Steels Pay Off"

Name_____

Company_____

Title_____

Address_____

MAIL THIS TODAY

If you use steels, here's the handbook you should have

This fact-packed handbook is a must for you if you use steel. Here, in completely documented form, you'll find how the use of alloy steels adds economies, increases service life, offers many other advantages.* Cost-conscious executives will find the full story on these economies of alloy steel in the first section of the handbook. Designers and metallurgists will find the advantages of alloy steels in the 60 case histories. Get your copy today. Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.

M55-18

***Advantages of ALLOY STEELS**

- longer life
- greater pay load
- lower operating costs
- greater safety
- less maintenance

CLIMAX MOLYBDENUM

Announcing...

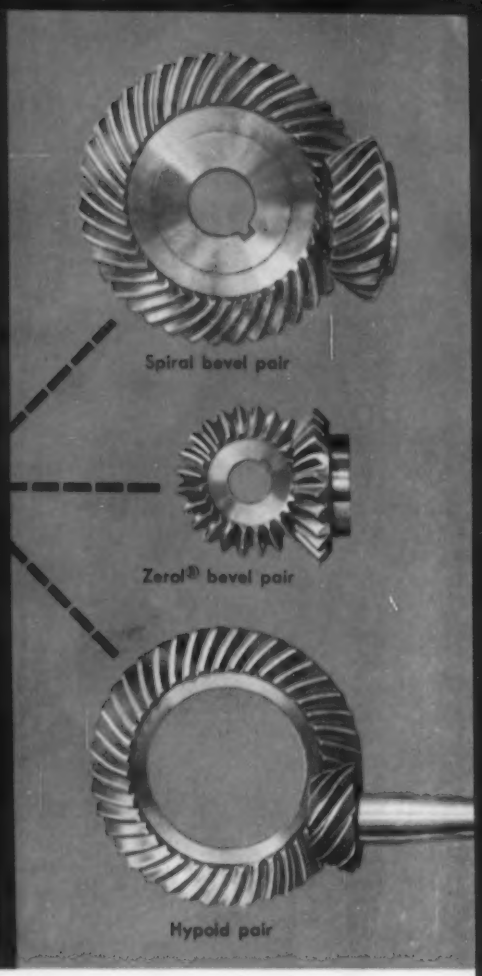
Axelson announces the purchase of the Fray Line of Milling Machines and Milling Attachments which have been manufactured by the Fray Machine Tool Company, Burbank, California, for the past 14 years.

The milling machines and attachments are now being manufactured in the same plant that has built the world famous Axelson Heavy Duty Lathes, Precision Tool Room Lathes, and Special Machine Tools since 1915. The same engineering knowledge and skilled craftsmanship that has steadily improved Axelson Lathes will now be used to produce Axelson Milling Machines.

AXELSON MANUFACTURING COMPANY
Division of U.S. Industries, Inc.
6160 So. Boyle Avenue,
Los Angeles 58, Calif.

Axelson
Milling Machines

Authorized dealers in principal industrial centers.



One cutter produced these three gear pairs!

The new Gleason No. 116 Hypoid Generator used *one* Unitool* Cutter to generate the three gear pairs shown above. Only five additional Unitool Cutters are needed on this generator to cut spiral and Zerol® bevel gears of any ratio, and hypoid gears of 3:1 ratio and higher; up to 18″ pitch diameter.

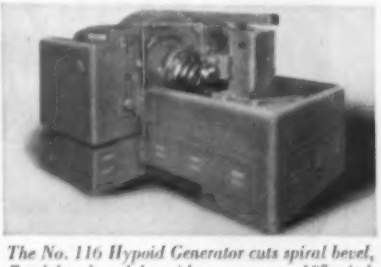
The Unitool Method was developed especially for use with the No. 116 Hypoid Generator, and its smaller counterpart, the No. 106 Hypoid Generator. This new method requires only a small tooling cost to cover the entire range of both machines.

It is intended for the production of small quantities of bevel and hypoid gears, and does not replace the cutting methods now in use for mass production. When using these methods, the No. 116 Generator is substantially faster than previous models.

In addition, the new features incorporated on the No. 116 offer simplification of tooth bearing development, improved quality, and much easier setup and operation.

We shall be glad to send more information on the No. 116 Hypoid Generator and the Unitool Method for producing small quantities of bevel gears.

** Trademark*



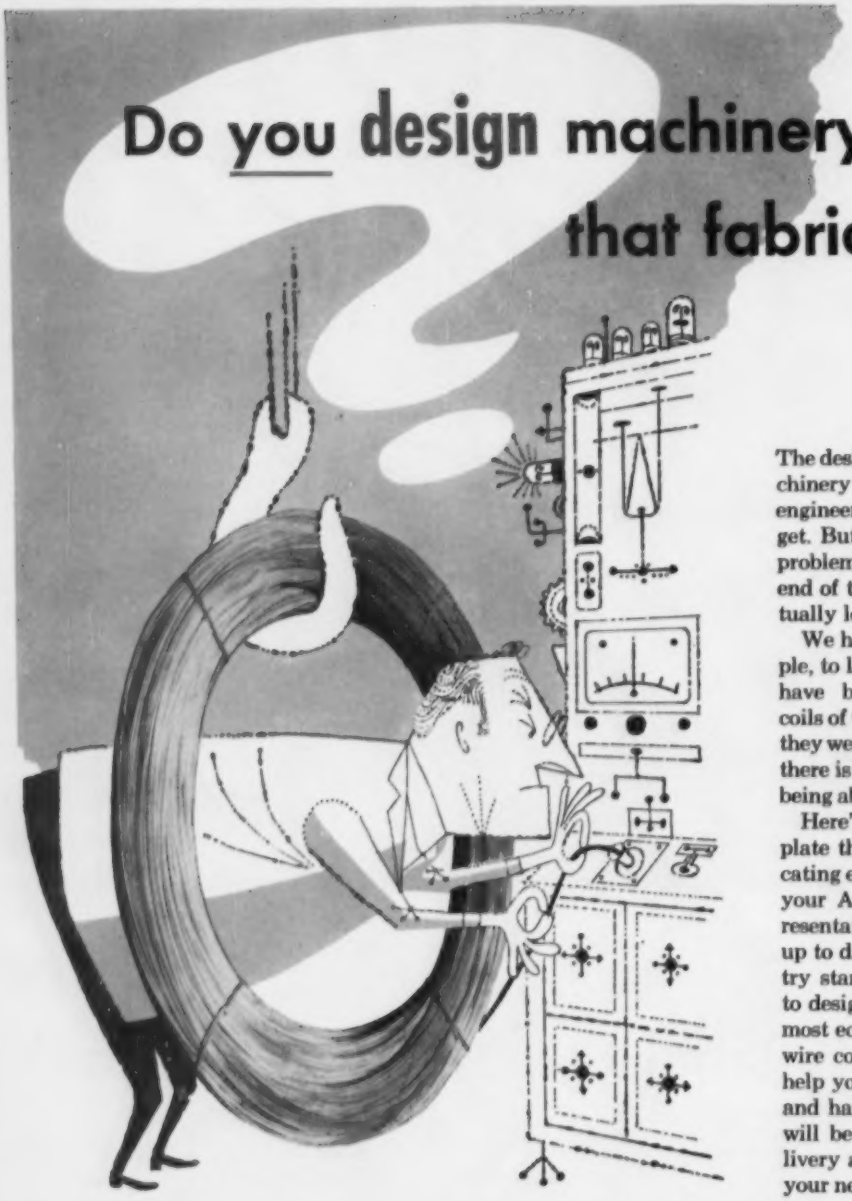
The No. 116 Hypoid Generator cuts spiral bevel, Zerol bevel and hypoid gears up to 18″ pitch diameter, any ratio up to 10:1, any pitch 2 DP and finer.

GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

Do you design machinery that fabricates wire?



The design of Wire Fabricating machinery is one of the most rigorous engineering assignments you can get. But no matter how tricky the problems, do not forget the front end of the machine—where you actually load the wire.

We have been amazed, for example, to learn that certain customers have been buying non-standard coils of wire for years, thinking that they were *standard* coils. Naturally, there is a shipping delay due to not being able to use standard material.

Here's an offer: If you contemplate the design of any wire fabricating equipment, get in touch with your American Steel & Wire representative first. Let him bring you up to date on the latest wire industry standards—and show you how to design the equipment to use the most economical types and sizes of wire coils. He will also be glad to help you lay out your wire storage and handling facilities. The result will be lower costs and faster delivery and better production using your newly designed equipment.

USS AMERICAN MANUFACTURERS WIRE

AMERICAN MANUFACTURERS WIRE

AMERFINE—*High quality fine wire.*

AMERSPRING—*music steel spring wire.*

AMERLOY—*alloy heading wire.*

AMERTEMP—*heavy-duty oil-tempered wire.*

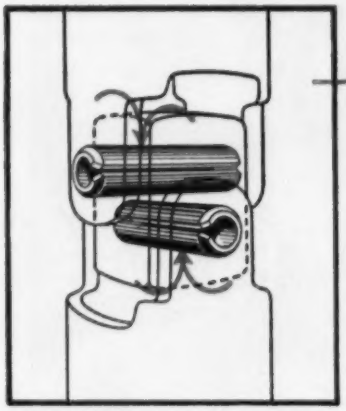
AMERHEAD—*uniform heading wire.*

AMERSTITCH—*extra-tough metal stitching wire*

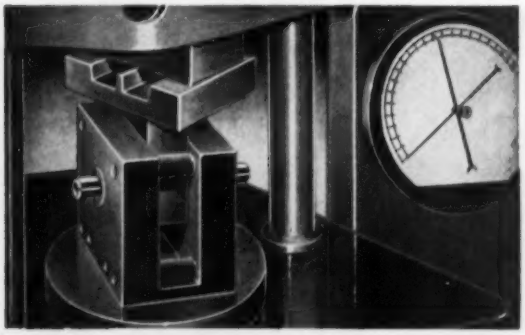
USS

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

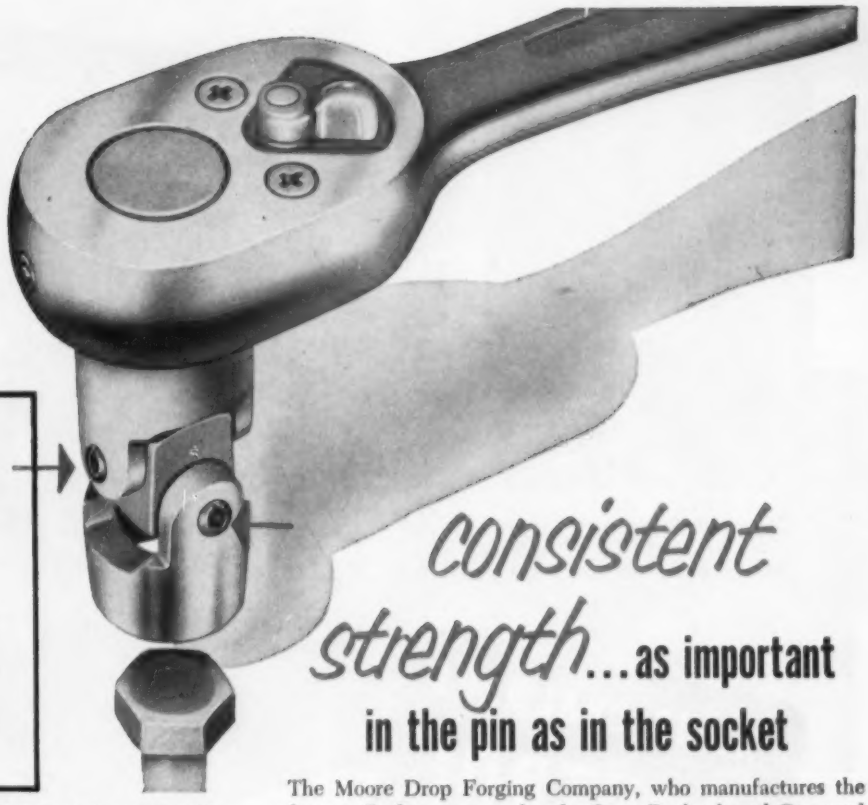
UNITED STATES STEEL



Normal leverage puts the load on the pins at these points. Pins must have a high resistance to shearing — and every pin must stand up to plenty of abuse. Many manufacturers' tests have proved Rollpin's uniformly high shear strength.



We urge you to test spring pins before you buy — for uniformity of diameter and length, hardness, insertion and removal forces, and recovery of diameter, as well as shear strength.



consistent strength... as important in the pin as in the socket

The Moore Drop Forging Company, who manufactures the famous Craftsman wrenches for Sears Roebuck and Co., used stainless steel rivets to fasten the universal joint on their Flex sockets. Thorough testing, under all possible load conditions and drive angles, convinced them that Rollpin was stronger than the stainless steel rivet previously used. This led to a redesign of the joint with Rollpins replacing the rivets. Also, the spring tension inherent in the Rollpin locking principle was used to provide the "drag" that holds the socket head in angular position. The result . . . an improved product at lower cost.

Dependability like this is based on the rigid ESNA® quality controls that insure consistent strength and mean reliable performance by every Rollpin.

Moore Drop Forging Company was able to save assembly time, too. Rollpin is simply driven into holes drilled to normal production tolerances. It compresses as driven, locking itself in place by exerting pressure on the hole walls. In this case, the extra operation of spinning on a rivet head was eliminated.

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. 829-377, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening information:

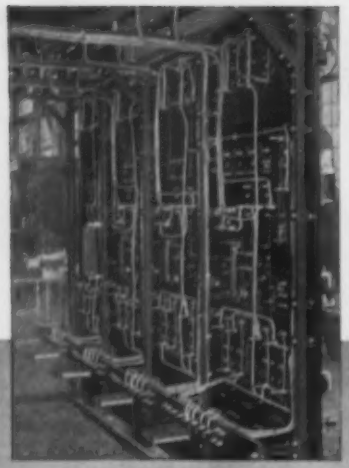
- ☐ Rollpin samples
- ☐ Rollpin bulletin
- ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone_____ State_____



Back of panel shows accessibility of terminal blocks and neat grouping of wiring.

Modern

Constant Potential Panels for Top Efficiency and Low-Cost Operation

Steel mill control is an Allis-Chalmers specialty. That's why many mills and their consultants are turning to Allis-Chalmers for engineering help and the latest in control equipment . . . equipment like this constant potential panel for dc auxiliary drives. Operating under the roughest conditions, this unit is providing smooth, precision performance . . . affording maximum production and quality with a minimum of outage time and maintenance.

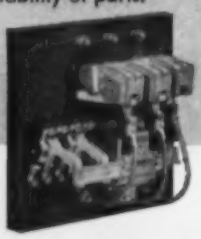
Constant potential and variable voltage systems, magnetic amplifiers, rotating, electronic and mechanical regulators, liquid rheostat — all engineered, built and applied by Allis-Chalmers — are building greater profits in modern mills. When you modernize to meet the double challenge of a growing market and heavy competition, take advantage of Allis-Chalmers experience. Call your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4588

Type 260 Contactor

Quick-quenching arc-centering blowout solves problem of contact burning by sharply curtailing arcing time.

NEW heavy-duty Type 522 contactors and Type 521 relays feature exceptional interchangeability of parts.



Type 522 Contactor

AC ALLIS-CHALMERS

ALLIS-CHALMERS

factory tests prove it!

23.9 man-hours saved for every 100 lbs. of lubricant used!

Alemite cuts costs!

all the way from barrel to bearing ...in maintenance...repairs... down-time...

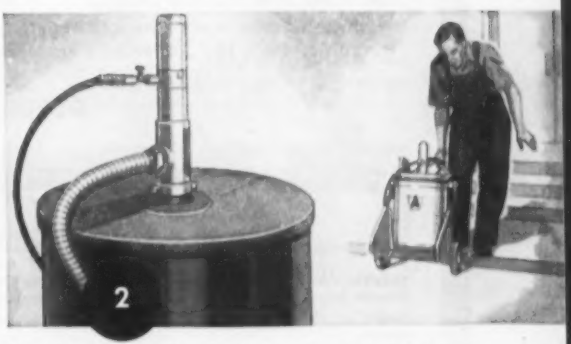
YOU SAVE...STEP BY STEP!

Any machine—anywhere in your plant—can have fast, power-operated high pressure lubrication—and you save up to 23.9 man-hours for every 100 pounds of grease applied! Your machines get added protection, insurance against costly breakdowns. You save in maintenance, down-time, labor and increased bearing life.

With this combination of Alemite equipment, every bearing is protected by "refinery-fresh" lubricant at all times. There is a combination of transfer pump and power gun just right for your plant, large or small—for any lubricant, light or heavy. Power guns are available in both air operated and electric models – from 25 to 50 pound capacity.

1

A drum of lubricant—any type—arrives at the plant—fresh—clean.



2

The Alemite Power Transfer Pump is inserted—lubricant is still sealed against contamination.

3

In just 60 seconds, transfer pump fills a big portable power gun with "refinery-fresh" lube.

Power gun goes to any department—even up and down steps—services hundreds of bearings!

4

With Alemite Plan "C"
Only Refinery Clean Lubricant Reaches Bearings

This combination of Alemite power transfer pumps and portable power guns is known as Alemite Plan "C". It is one of the five Alemite plans that your nearest Alemite supplier can show you. Ask him for your copy of the new Alemite Booklet "5 Plans for Better Lubrication." It will help you make lubrication plans that save money in your plant!

FREE! **New Booklet: "5 Plans for Better Lubrication"**

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Please send me my FREE copy of "5 Plans for Better Lubrication."

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Ask Anyone in Industry

REPUBLIC CHAIN

Republic's Round Chain Division produces a complete line of welded and weldless chain, fittings and assemblies for the numerous plant operations involving hoisting, hauling, holding, bundling and towing. Or if you require chain for use with the product you make, Republic can supply it. And Republic is the only chain producer who can control quality from raw material to finished product.

Illustrated are some basic chain patterns made by Republic. Each has a specific use. Examine them. They may be just what you need to improve your product or plant operation.

Republic Chain Engineers are available to help you make the right chain selection. Or to help you work out profitable solutions to your chain problems.

Order Republic Round Chain from your industrial distributor. He's backed by Republic Warehouse Stocks in principal cities from coast to coast. If you want more facts, mail the coupon.

REPUBLIC WELDLESS CHAIN

BUCKEYE—Used for gymnasium and playground equipment, fixtures, suspensions and many other general purpose applications. Furnished in bright, electro-galvanized and hot galvanized standard finishes.

DOUBLE JACK—For ornamental chain, light fixture suspension, toys and other general utility applications. Furnished in standard finishes of bright, electro-galvanized, coppered, nickel plated, brass plated and cadmium plated.

SINGLE JACK—A light chain suitable for uses not requiring high strength, like fixture suspension, anti-loss, etc. Standard finishes: bright; electro-galvanized; hot galvanized; coppered; nickel plated; brass plated; cadmium plated.

SASH—Suitable for the many operations requiring flat metal chain which operates smoothly over pulleys. Furnished in mild steel, stainless steel, bronze. Standard finishes: bright; electro-galvanized; coppered; nickel, brass and cadmium plated.

LADDER SPROCKET—For sprocket wheel drive on small, light mechanisms; toys; ornamental chain and other light general purpose uses. Available in mild steel, high tensile steel, stainless steel. Furnished in standard bright finish.

LOCKWEAVE—For sprocket wheels, valve wheels, overhead doors, ventilators, machinery. Ideal for general utility uses requiring relatively high strength. Available in these standard finishes: bright; electro-galvanized; hot galvanized.

REPUBLIC "NYLOK" NUTS HELP REDUCE ASSEMBLY COSTS by eliminating lock washers, slotted nuts and cotter keys. Yet they assure positive locking in any position, even under severe vibration. Assembly is speeded, too, because either end of the nut is up. No special tools, techniques or lubricants are needed to start them. "Nylok" Nuts can be backed off for maintenance of equipment and re-used. Investigate their use for your product. "Nylok" Nuts are only one of more than 20,000 types and sizes of fasteners made by Republic for all industries.

HIGH DUCTILITY, PLUS ITS PROVED WEIGHT SAVING, may make you want to know more about Republic High Strength Steels. Their application to various products permits weight reduction up to 25%. And when your product is designed and engineered all the way for high strength steel, weight reduction up to 50% is possible. Republic High Strength Steels are ideally suited for use in structural parts for earth moving equipment, truck and gasoline trailers, railroad uses. They resist corrosion, extend equipment life by standing up to rough usage.

A complete line for a wide range of product applications—plant operations

REPUBLIC WELDED CHAIN

PROOF COIL (COMMON COIL)—Standard commercial chain suitable for all ordinary purposes which require welded chain of moderate tensile strength. Regularly supplied in self-colored or hot galvanized finish. Test certificate furnished on request.

HIGH TEST (SUPERSTEEL)—Highly desirable for load binding or other chain applications requiring light weight, strength and long-wearing qualities. Permits the use of smaller and lighter chain. It's made from high carbon cold drawn steel, electrically butt-welded. Standard finish: bright. Test certificates furnished on request.

BBB COIL—Extensively used for purposes requiring chain of better than ordinary quality. Links are shorter than Proof Coil, increasing flexibility and distribution of shock load over a greater number of links. Regularly supplied in self-colored or hot galvanized finish.

ALLOY STEEL—Used in chain sling service and other heavy duty work requiring minimum weight and wear-resistant chain of the highest tensile strength. Links are electrically butt-welded and heat treated giving a tensile strength of 125,000 p.s.i. Made from high quality Republic Alloy Steel. Tested and warranted.

LIBERTY MACHINE—A bright finish chain, twist or straight link, for general use where strength and compactness are required. Other standard finishes: bright, galvanized, and hot galvanized. Can be furnished case hardened in any finish except hot galvanized. Links are electrically welded.

CHAIN SLINGS—Supplied in alloy steel, wrought iron and high test Supersteel. Each is proof tested and warranted for the highest degree of safety. Made in single, double, triple and quadruple sling assemblies. Special slings, assembled with Republic Chain and Chain Fittings, are built to specific requirements.

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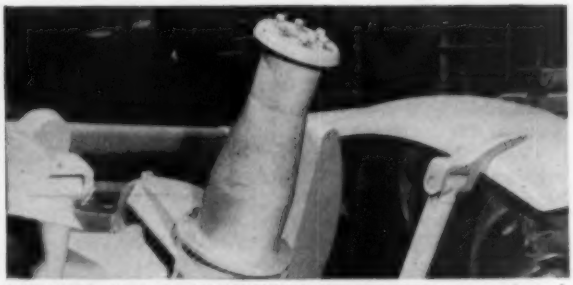
World's Widest Range of Standard Steels and Steel Products



WHEN STEEL PARTS REQUIRE TOUGHNESS AND STRENGTH you can depend on Republic Alloy Steels to do the job at the lowest ultimate cost. This "king bolt" on the Caterpillar DW15 Tractor links tractor and scraper or wagon. It has to take the pull, the shocks and the bumps when a tractor drags heavy equipment over uneven ground. Caterpillar uses Republic Alloy Steel for this part. In fact, Republic has been supplying Caterpillar with alloy steels for a good portion of 50 years. And helping them use it to the best advantage.

Republic Steel Corporation
3104 East 45th Street
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Please send more information on:

- ☐ CHAIN, Types_____
- ☐ "NYLOK" NUTS ☐ HIGH STRENGTH STEEL
- ☐ ALLOY STEEL

Name_____ Title_____

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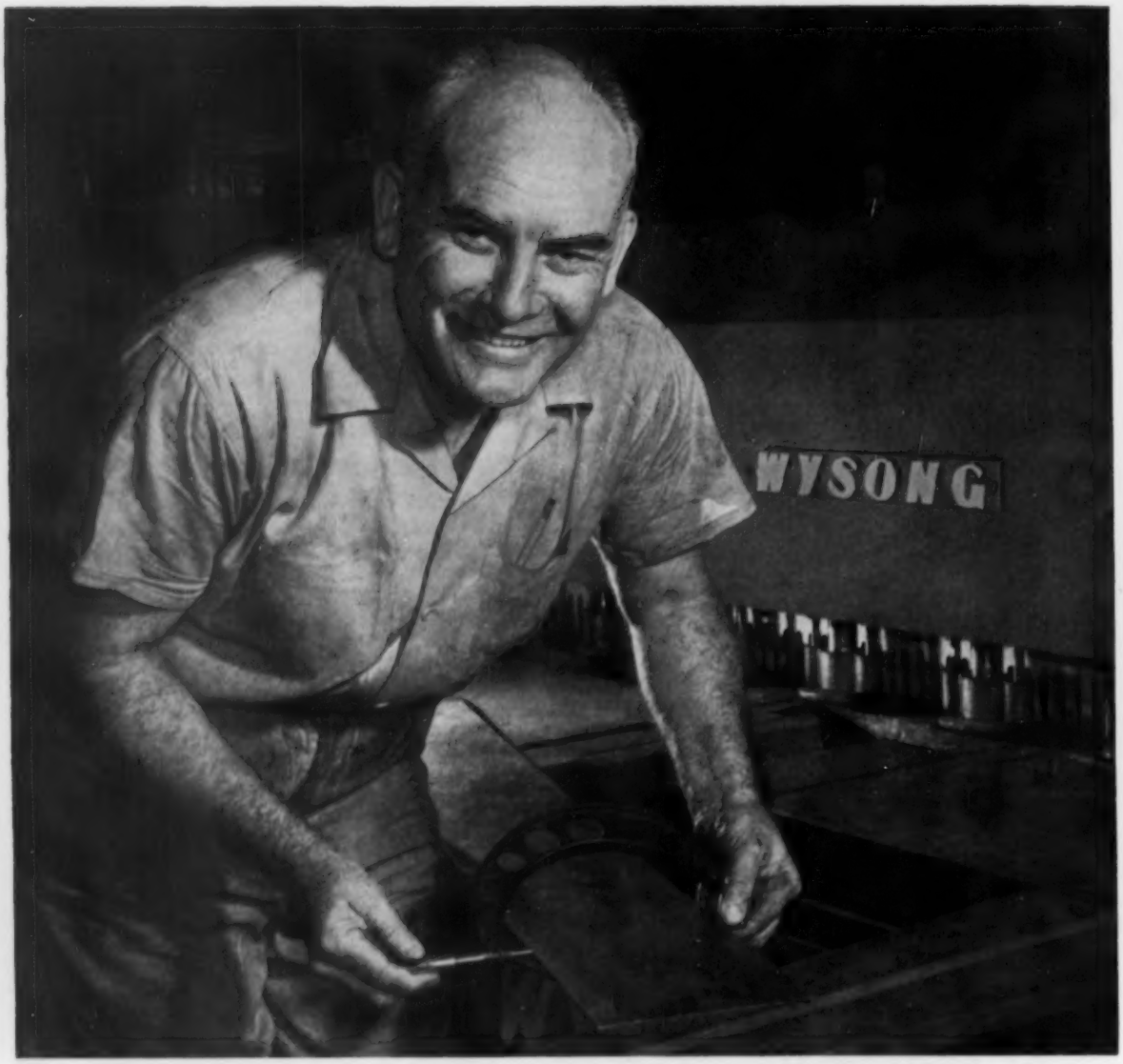
R-6259



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When you use a Wysong, you will know what I mean—a clean, *accurate* cut and complete confidence that the next cut will be just like it.

Wysong Shears are designed and built for that kind of shearing — rugged enough to withstand the shock of capacity shearing, rigid enough to maintain accurate alignment.

You will want to know about the rigid, hi-tensile castings; the drive unit which runs in oil; the non-repeat unit; the positive, compensating holddown; the ball-bearing precision back gauge; and other superior Wysong features. They add up to SHEAR SATISFACTION—for the boss and the operator, too.

Before you buy, investigate WYSONG . . . it's MILES ahead! See your dealer or write factory for new catalog.

WYSONG

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Builders of Precision Machines For Over Fifty Years.

use 'dag' dry films for trouble-free lubrication

Treat your steel forging dies with 'dag' Colloidal Graphite and increase the number of acceptable forgings per die by as much as 100 percent. The *dry lubricating film* formed by colloidal graphite protects both dies and forgings. Freedom from scaling and sticking often eliminates some of the usual finishing operations on forgings, and greatly extends die life.

'dag' Colloidal Graphite is much more effective than ordinary high-temperature lubricants, including the best of powdered graphite. It is high-purity, electric-furnace graphite, specially treated by Acheson to produce microscopically fine particles. Dispersed in many fluid carriers for convenient application, 'dag' Colloidal Graphite will not burn, flake, or gum, at temperatures commonly encountered in metalworking operations.

'dag' dispersions are used profitably in stamping, deep-drawing, piercing, casting, forging, stretch-forming, and wire drawing. You'll find a surprising number of ways to use 'dag' dispersions described in our free booklet on 'dag' Colloidal Graphite for Metalworking Operations. Write for Bulletin No. 462-X2.

You can double the service life of steel forging dies

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of carriers.

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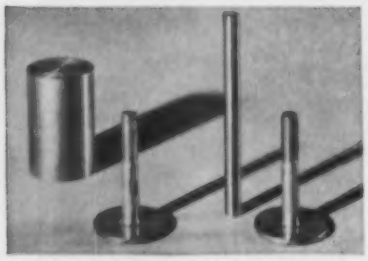
(Advertisement)

BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

Bridgeport Brass Co. — Reporting new developments in copper-base alloys and metalworking methods.

Cold Heading Cuts Metal Requirements 96%



Part at left was machined from rod. Piece at right was formed by Camcar Cold-Flow process from Bridgeport wire stock. Note the large head produced from the relatively small diameter stock. (Courtesy, Camcar Screw & Mfg. Corp., Rockford, Ill.)

When a midwestern manufacturer machined the special screw fastenings pictured above from solid bar stock, he used 210 pounds of metal per thousand pieces produced. Of this, approximately 200 pounds went into scrap as screw machine turnings.

By changing to advanced cold-forming techniques, the same manufacturer now makes a thousand pieces of the same product from only 8.3 pounds, *a metal saving of 96%*. Too, his cold-headed product is stronger and made to closer tolerances than its machine-turned counterpart.

This is just one example from many hundreds where the switch to cold forming brought both tremendous savings and product improvement at the same time. The process is precise, fast and efficient, ideally suited to close-dimensional, high-speed mass production.

In order for the cold-forming process to work, the metal has to be specially selected for its cold-working properties as well as the qualities wanted in the finished product.

Bridgeport produces a number of carefully finished alloys particularly suited to the severe working requirements of the cold-forming operation and well recommended for their finished properties. One of them is Bridgeport Silicon Bronze, Alloy No. 609.

Exceptionally malleable, even when hard drawn, Bridgeport Silicon Bronze is excellent for all types of cold-headed and roll-threaded products, particularly the extremely large-headed bolts as those described above. Its finished strength can reach 100,000 psi tensile, yet when properly made, parts require no heat treatment after forming. And the high resistance to stress corrosion recommends Silicon Bronze highly for outdoor construction.

Round ID, Hex OD Tube Permits 26% Cost Saving

Illinois Engineering Co., Chicago, a division of American Air Filter Co., used to machine the inlet connection lock nut for their Thermostatic Radiator Traps from solid hex brass rod. Though this method is not unusual, it required excessive machining time and scrap losses were high.

Bridgeport round ID, hex OD tube cut 26% from production costs of radiator trap lock nut.

Bridgeport's Technical Service recommended Round ID, hex OD brass tube as a more economical material. The results: a marked saving in metal and, except for threading, the complete elimination of machining on the inside of the nut. *Costs were reduced 26%.*

This is a typical example of how Bridgeport Technical Service can increase profits by reducing costs. Chances are there are a number of similar opportunities for savings around your plant.

Bridgeport Technical Service engineers are at your call to help turn up just such opportunities. The answer might be a switch to another of the complete line of alloys Bridgeport manufactures for screw machine operations—or it could be a switch in mill shape: rod to tube, tube to wire, etc.

In either case, savings can be made when Bridgeport Technical Service is on the job.

Bridgeport Phosphor Bronze makes lifetime spring contact for attachment plug.

Spring Parts That Last a Lifetime

An important factor in many electrical devices is spring parts that go right on flexing year after year without losing their resiliency. That's exactly what Hopax Electric, New York, built into their new type attachment, the Hopax Circuit Breaker Plug, using Bridgeport Phosphor Bronze.

An engineered alloy with exceptional spring properties, Bridgeport Phosphor Bronze, Alloy No. 36, Grade A, gives unusual service life under repeated flexing. Its fatigue and wear resistance is high... it withstands arcing better than brass... and its corrosion resistance and higher conductivity are positive advantages over rustable material.

Bridgeport Phosphor Bronze No. 36, Grade A—and No. 35 Grade C, for more severe use—are recommended for dependable use in electrical snap switches, diaphragms, current collectors, spring contacts and many other electrical components. To find out how they can work for you, check with your Bridgeport representative today. (3380)

Visit Bridgeport's exhibit
Booth 162 at the
WESTERN METALS EXPOSITION
Los Angeles, March 28 to April 1

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Improves product life and appearance

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Protects against rust and corrosion

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Eliminates plating and finishing

● For *lower* production costs, *greater* product quality, specify Brainard Electro-Galvanized Steel. Its built-in zinc finish protects both inside and outside of formed and drawn parts . . . permits fabrication by any standard method, without damaging the coating.

This new, easy-to-read booklet provides full details—covers fabrication, quality control, range of sizes, nationwide technical assistance. Find out how you can obtain better product quality at less cost. Send coupon today for your free copy.

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Please send free descriptive booklet on Brainard Electro-Galvanized steel.

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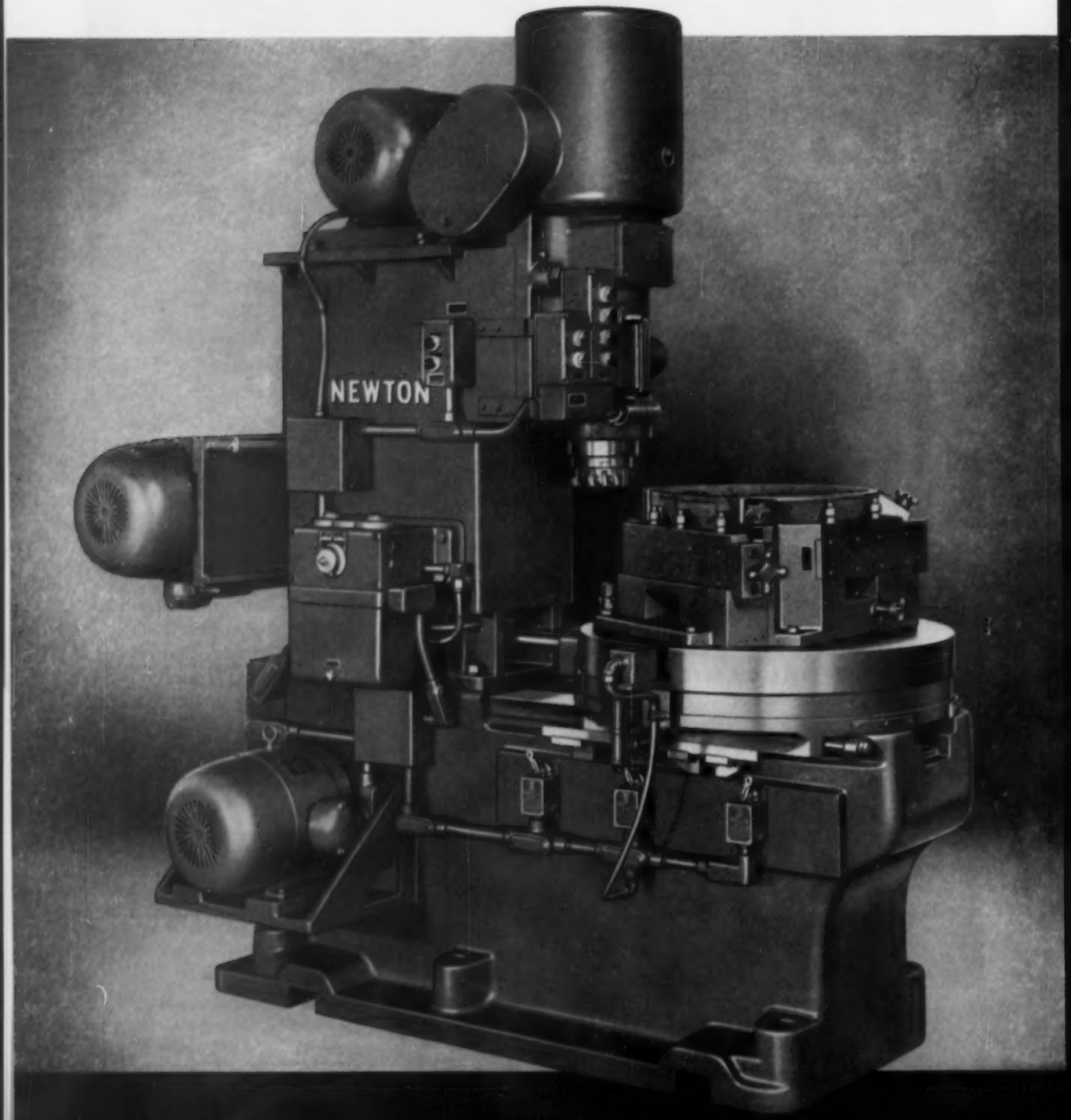
For Milling the flanges

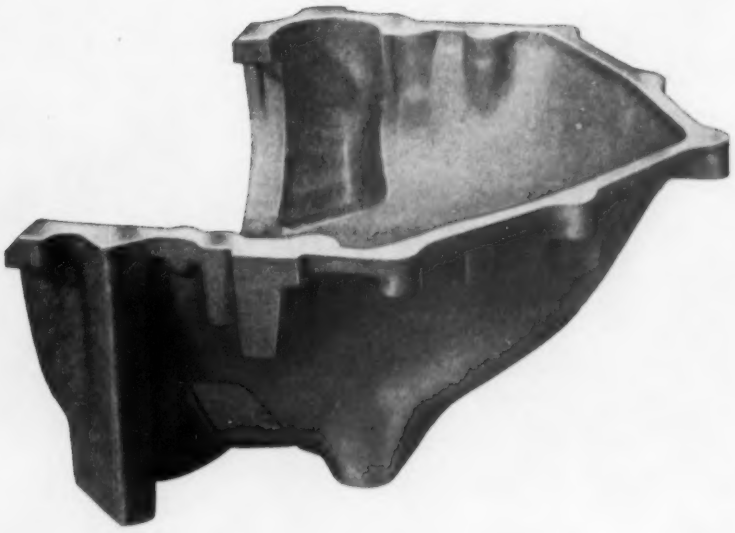


CONSOLIDATED MACHINE TOOL

A Division of Farrel-

of thin Castings...

Newton Vertical Rotaries



- **You *can't* mill the flange on this flywheel housing like you would a cylinder block. It's too thin for big diameter cutters.**
- **But you *can* mill it with a small diameter cutter on a Newton Vertical Rotary and *mill it fast!* All the operator does is load, push a button and unload. A 100 per cent automatic feed and traverse cycle does the rest.**
- **Of course, it is the *circular feeding of the table* that turns the trick and allows you to use small diameter cutters on this kind of work.**

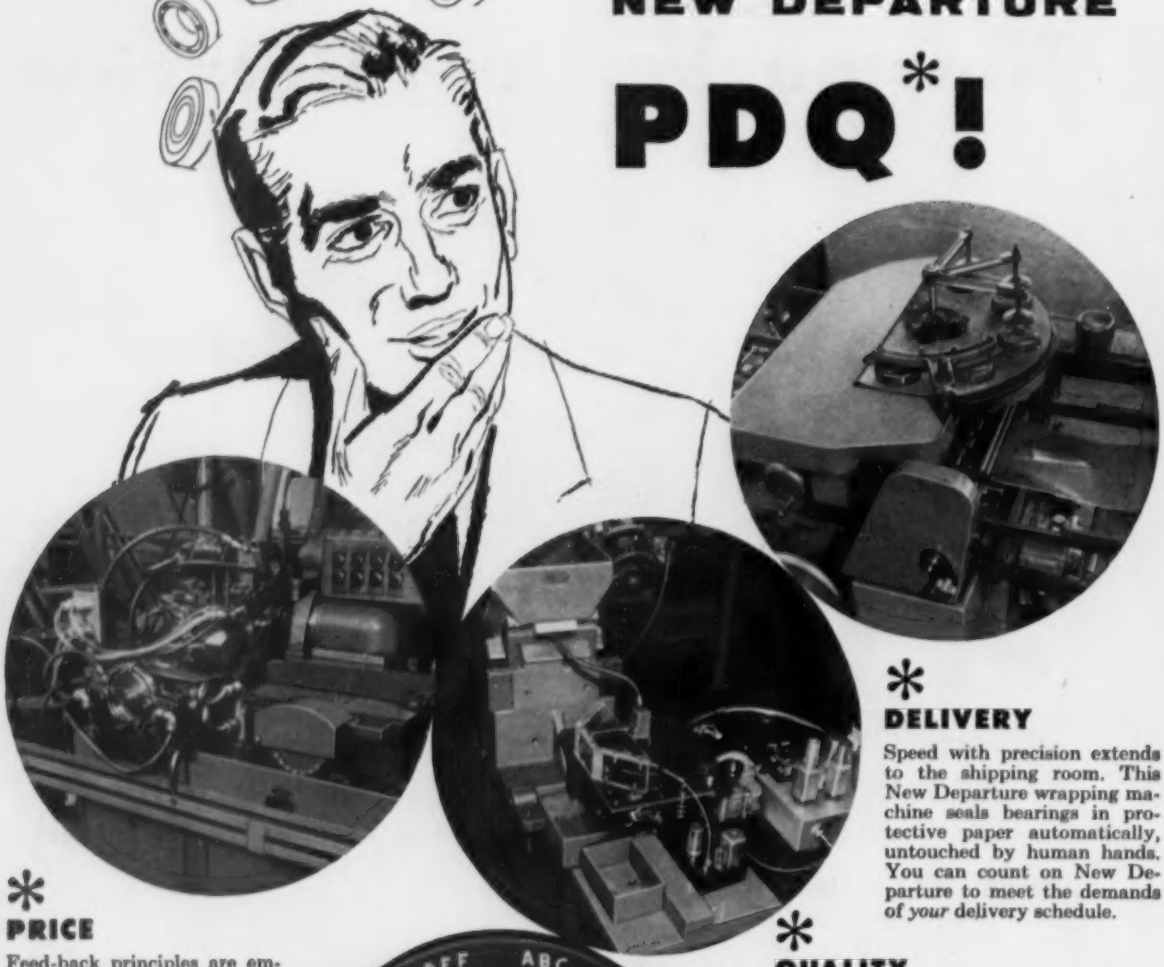
COMPANY, ROCHESTER 10, N. Y.

Birmingham Company, Incorporated

BEARING PROBLEMS? ------Call on

NEW DEPARTURE

PDQ*!



*

PRICE

Feed-back principles are employed in this ball race form grinder at New Departure. The machine automatically adjusts to maintain specified tolerances. More perfect pieces per hour mean lower costs for the bearing user.

*

DELIVERY

Speed with precision extends to the shipping room. This New Departure wrapping machine seals bearings in protective paper automatically, untouched by human hands. You can count on New Departure to meet the demands of *your* delivery schedule.

*

QUALITY

Quality control is of prime importance in the high-volume, ultra-precision manufacture of ball bearings. Balls are automatically inspected by an electronic scanning device that operates with a speed and accuracy considered to be impossible a few years ago.

PLUS ENGINEERING SERVICE

New Departure engineers are ready to help with your ball bearing problems. And when you consult with New Departure you get the benefit of more than 50 years' experience in ball bearing design and manufacture. Call, wire or write . . . New Departure can help you . . . PDQ!

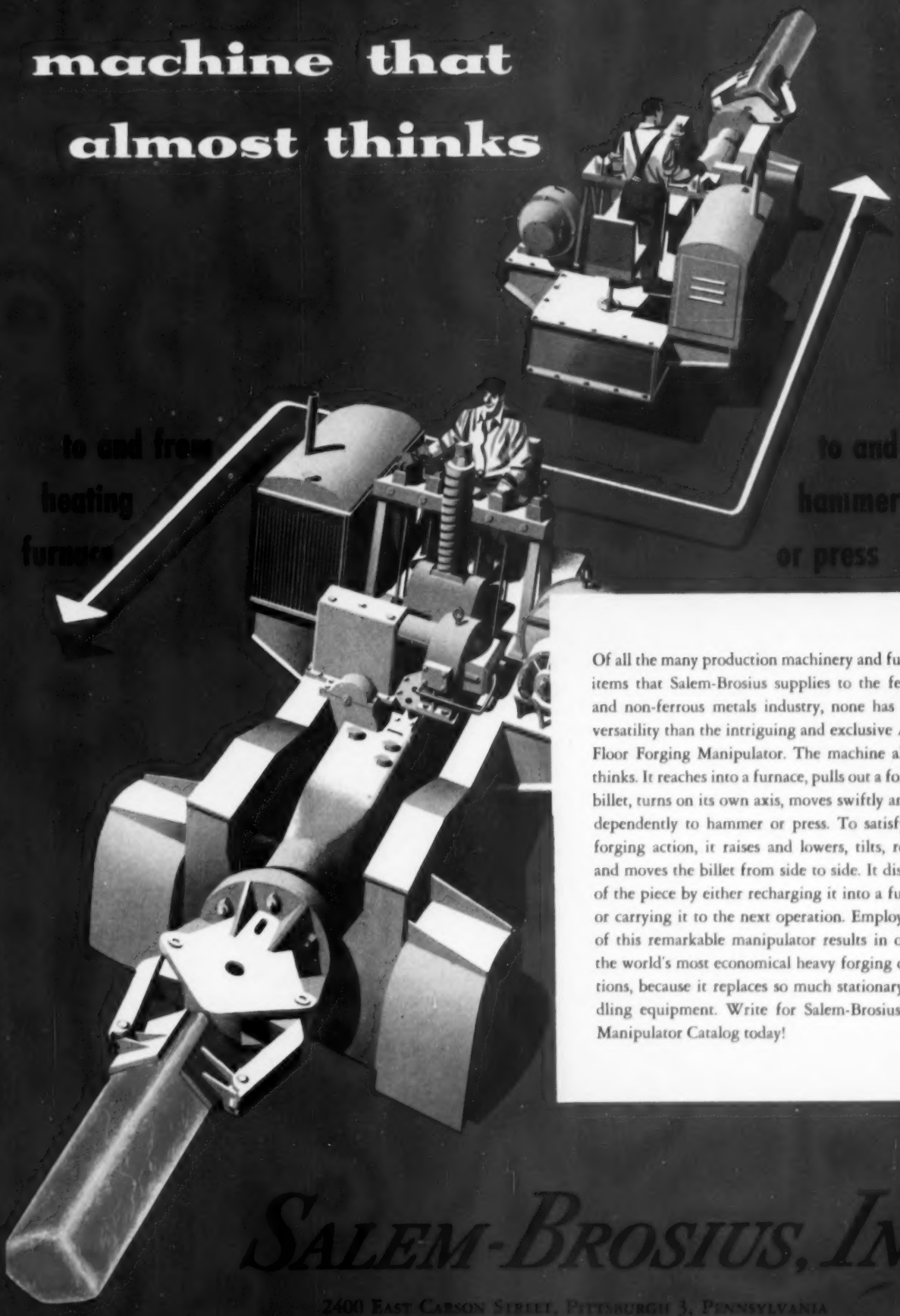
NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

NEW DEPARTURE

BALL BEARINGS

NOTHING ROLLS LIKE A BALL

machine that almost thinks



Of all the many production machinery and furnace items that Salem-Brosius supplies to the ferrous and non-ferrous metals industry, none has more versatility than the intriguing and exclusive Auto-Floor Forging Manipulator. The machine almost thinks. It reaches into a furnace, pulls out a forging billet, turns on its own axis, moves swiftly and independently to hammer or press. To satisfy any forging action, it raises and lowers, tilts, rotates and moves the billet from side to side. It disposes of the piece by either recharging it into a furnace or carrying it to the next operation. Employment of this remarkable manipulator results in one of the world's most economical heavy forging operations, because it replaces so much stationary handling equipment. Write for Salem-Brosius' new Manipulator Catalog today!

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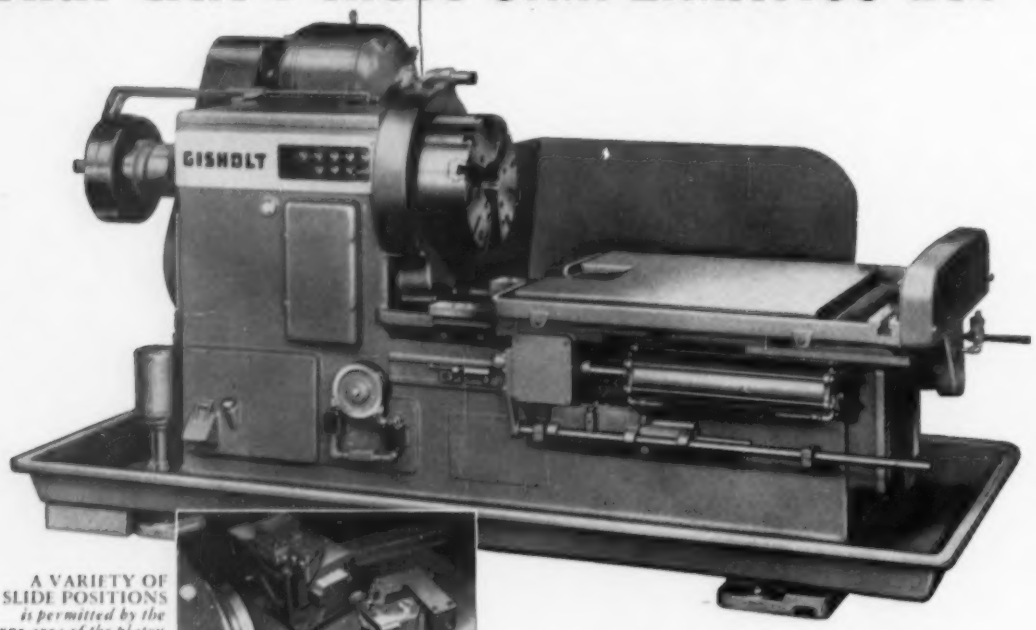
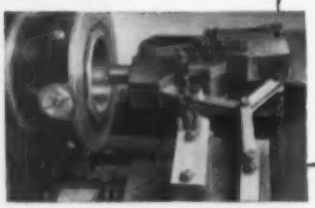
What CAN'T these SIMPLIMATICS do?



A VARIETY OF SLIDE POSITIONS *is permitted by the large area of the platen table. Angular feeds are no problem. Compound slides are unnecessary.*

TAILSTOCKS *can be mounted on platen table for between-centers work; can be operated by hand or pneumatically.*

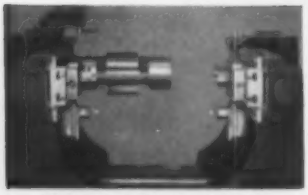


A LINKAGE ARRANGEMENT *between the slides can be used for spherical boring in conjunction with facing and turning.*

It's this simple basic design that makes the Simplimatic so readily adaptable to solve a variety of machining problems. It's a standard machine—yet it can be individualized to give you the high speed production of an automatic lathe designed solely for the job at hand. Think of the difference in cost.

The adaptations shown here are only a few of the almost unlimited possibilities of the Simplimatic. When you have a "special" job of machining parts in large volume, look into the Simplimatic before you build a special machine. The chances are good you'll save time and money.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*



SIMULTANEOUS DOUBLE END MACHINING *is possible with full utilization of base machine.*

VERTICAL HEAD. *Tool slides can also be mounted on a vertical instead of horizontal platen. A choice of arrangements is possible.*

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

FORECAST

The Iron Age Newsfront

Large Forgings to Closer Tolerances

Closer tolerance large forgings are now a possibility. One large forge shop has installed furnace equipment that heats large forgings practically scale free. Furnaces generate their own atmosphere.

Steel: Strong Third Quarter Demand

Broadening base of steel demand is easing concern in the industry over extent of a third quarter letdown should automotive cut its requirements. Most people look for a softening in automotive demand. But it's not likely to be as sharp as feared. Strong buying by other industries will cushion impact of an auto letdown.

Improved Foundry Methods Sought

A completely new foundry method of making alloy steel castings that will compete with wrought materials in aircraft is sought in a research project. Ceramic molds, one of the features already developed, are prepared in a complete small size ceramic plant.

Plate Supply Grows Tight

Plate fabricators, worried earlier this year by plate shortage possibilities, are now reporting frank concern. On top of unexpected early buying by linepipe producers, highway buying, and construction equipment builders has been added a stronger than expected level of buying by general fabricators.

Check Cutting Tools While in Use

One Midwest firm has devised a unique method of determining when a cutting tool is becoming dull without interrupting the work. Power intake of drive motor is watched closely. By plotting power consumption at various depths and feed speeds for different metals, abnormal power draw is quickly detected and the tool replaced.

Trucks May Use Automatic Drives

Informed automotive sources look for a big boost in the demand for automatic transmissions in 1955 as well as a booming market for new vehicles. Extension of automatic drives to the truck field will add to growth of automatic driving in passenger car field.

Mills Show Interest In Beehive Coke

Some activity may be developing between the steel mills and the beehive coke industry. The tipoff comes from several recent spot purchases by mills. However, the undercurrent is weak and none of the mills will commit themselves for regular shipments at this time.

How Oxygen Steelmaking Shapes Up

The new oxygen steelmaking process used by McLouth Steel Corp. is producing 40-ton heats of low carbon steel in 18 to 23 minutes blowing time. Average output of the company's electric furnaces ranges from 17 to 23 tons per hour. Estimated saving is $3 per ton compared with openhearth steel. Nitrogen content of oxygen process steel is substantially below the lower limit for openhearth steel.

New Titanium Uses Sought

The search for new markets for titanium has brought many test applications based principally on corrosion and heat resistance. The metal is being evaluated for use in anodizing racks, dairy equipment and handling of corrosive media in chemicals industry.

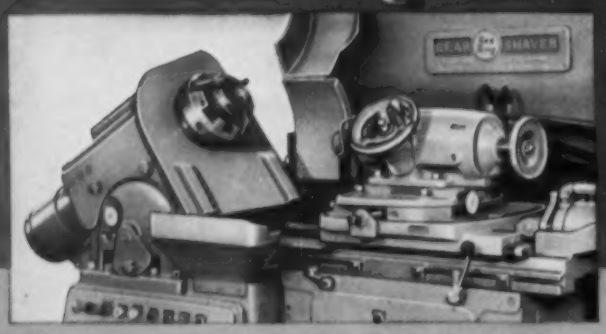
Predict New TV Steel Table Model

Nobody's talking, but it appears the television industry is again preparing to expand its steel utilization as it did last year when steel table model cabinets hit big production for the first time. Another more successful try at a steel console model by the TV industry is predicted this year.

NEWSFRONT · NEWSFRONT · NEWSFRONT · NEWSFRONT · NEWSFRONT

New Machine *Shaves* INTERNAL GEARS *Faster* and to *Closer* TOLERANCES

This new Red Ring Model "GCR" is a high production, high precision shaving machine for a broad range of internal gears. It provides two methods of shaving and many advantages which heretofore were available only on external gear shaving machines.



- It will precision shave all spur or helical internals 3" to 12" PD, up to 4 diametral pitch with face widths to 2½".
- It will operate on an automatic and selective feed cycle.
- It provides the opportunity to use a new, rapid PLUNGE-CUT shaving cycle in addition to conventional shaving.
- Crowning by the Plunge-cut method is optional.
- It will taper-shave gear teeth.
- It assures precision comparable to that established by Red Ring Machines for external gears.
- It reduces loading and unloading time to a minimum.
- It handles gears having integral shafts.

When using the automatic feed cycle a selected number of cutting strokes, each with its own selected increment of up-feed, can be combined with whatever idling strokes are desired. At the end of the cycle the machine automatically stops in the proper backlash position for rapid unloading.

If your manufacturing program includes internal gears, write for complete information on this new shaving machine.

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

2113

STEEL: Will Spend $800 Million in '55

Expansion and modernization program will be fourth largest in post-war period . . . Emphasis on raw materials and finishing capacity . . . New wave of ingot expansion forecast by '59—By T. M. Rohan

◆ THE STEEL industry will spend over $800 million this year for expansion and modernization. It will be the fourth best year for steel spending in the postwar period.

Bulk of this year's investment in expanding and improving raw materials sources and production facilities will go toward further balancing finishing capacity with ingot production. Ingot expansion has tapered off, but only momentarily.

In line with the expanding economy and expected increases in population, a new ingot expansion wave is likely to hit the industry in 1958 or before. Since 1951, steel mills increased metal-producing capacity by 21 million tons. Expansion last year was 1.4 million, compared to 6.8 million in 1953 and 8.9 million in 1952.

Of this year's total, the mills will spend about $125 million in first quarter, $192 million in second.

Emphasize Flat Rolled

Steel economists mulling over their slipsticks and computers see a new expansion wave of up to 10 million tons capacity by about 1959, give or take an expected "flat" year.

Biggest expansion is expected in flat-rolled products generally, cold rolled sheets and tinplate in particular.

How far the expansion will go is anybody's guess. J. L. Block, Inland Steel president, says that within the next 25 years, U. S. consumption may hit 200 million tons annually.

Since World War II, U. S. Steel Corp. has spent $2.5 billion on expansion. Major items this year are replacement of coke oven batteries and completion of three new ones in Pittsburgh area, and completion of silicon sheet production facilities there. In Chicago two openhearth furnaces are being rebuilt for greater capacity and strapping production facilities are being expanded.

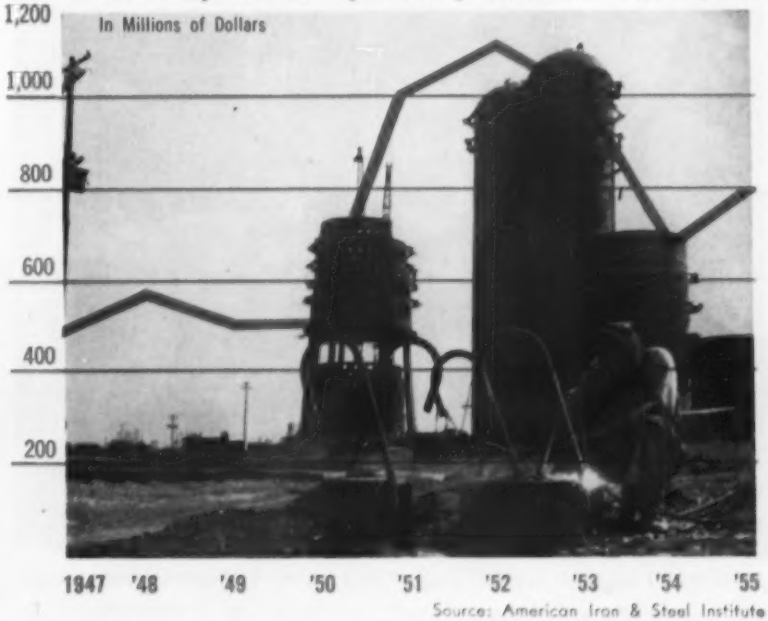
Large 52 in. structural mills there and in Pittsburgh are also being improved. First shipment of cold expanded line pipe was made last week from the Lorain, O., mill of National Tube. A new rod mill in Cleveland is also expected to start production this year and an additional electrolytic tinning line will be completed in the third quarter at Tennessee Coal & Iron.

Bethlehem Spending

National Steel announced a $60 million expansion and improvement program including a new five-stand cold mill at Weirton, a fourth electrolytic tinplate line there with 33 pct increased capacity and a new sintering plant. Other Weirton improvements listed include complete rebuilding of the 54 in. continuous four high sheet mill there.

At the subsidiary Great Lakes Steel Co. a blast furnace is being rebuilt and enlarged with capacity increase from present 20,000 tons

Steel Expansion Spending Headed Up Again



Source: American Iron & Steel Institute

per month to 50,000. In addition the soaking pits and annealing furnaces will be enlarged and improved and the continuous hot strip mill refurbished.

Bethlehem Steel last month announced finished steel production capacity will hit 15.1 million tons on completion of a $100 million expansion under way, mostly in light products. This is double the 1946 total and triple the 1930 figure. Total ingot capacity is now 19.1 million tons.

Most of Republic Steel Co.'s money this year is going into taconite development in Minnesota where it shares a $180 million bill with Armco. In the last 5 years the company has spent $100 million on new raw material sources, including 25 pct of Iron Ore Co. of Canada in Labrador. This year it is also expected Republic will announce plans for expansion of its Gadsden, Ala. sheet and strip operation. President Charles White also recently indicated a continuous galvanizing line will be installed there with some equipment transferred from other mills.

Jones & Laughlin's plans call for $51 million capital improvements in 1955, and in J&L's annual report, Board Chairman Adm. Ben Moreell said it's possible the firm may spend even more than announced. Principal projects include additional equipment for making joist sections at the Aliquippa bar mill, more high-strength and integral point seamless tube products for the oil industry and increased wire and wire specialty output. A continuous hot galvanizing line for sheets at Pittsburgh is planned.

This year J&L acquired W. J. Holliday steel warehouses in Indianapolis and Hammond, Ind., and subsidiary the Monarch Steel Co.

Details of a $58 million expansion program in sheet and strip including 360,000 additional annual tons open hearth capacity were announced by W. W. Sebald, Armco Steel President.

Steelmaking capacity at Armco's headquarters plant in Middletown, O., will be increased by 360,000 tons per year through addition of two 275-ton openhearths with provision for two more in an $18 million program.

Inland Steel at Chicago is planning the heaviest capital investment in its history this year at over $40 million. New mill installations to be completed include a 325,000 ton annual capacity wide flange beam mill for medium sizes and a third continuous galvanizing mill which will boost galvanized capacity 60 pct.

Wheeling Steel Co. in June will be in production on a new continuous galvanizing line for its patented "Softite" galvanized in a $10 million expansion program. This will extend the range of products to 10 to 30 gauge and up to 48 in. wide. Capacity will also be raised to 30,000 tons per month.

Pittsburgh Steel Co. has not announced any expansion plans for the year as yet but rumors are a 10 year plan is being formulated.

McLouth Steel is just winding up a $100 million expansion program. Its new facilities for oxygen steelmaking were shown for the first time last week. The $7 million oxygen installation has been running about 5 or 6 weeks and is expected to cut $3 per ton from steelmaking costs. Scheduled for completion about April is a new 50-in. cold mill.

Rotary Steel this year is building a 220 ft extension on cold finishing facilities for bars.

At Youngstown Sheet & Tube unexpended balance of capital appropriations at the end of 1954 was $18.5 million. Items still being completed at Campbell Works are a second new battery of 76 coke

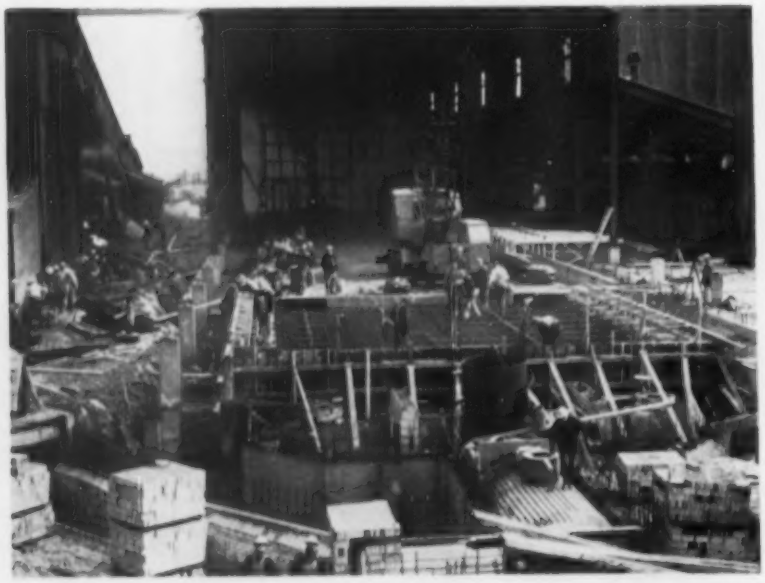
Ben Fairless Says:

In testimony before Senate Committee on Banking and Currency, Benjamin F. Fairless, chairman U. S. Steel Corp., said:

". . . it costs at least $300 to build a single ton of wholly-integrated new capacity . . ."

". . . if it (per capita steel demand) . . . continues to rise as it has in the past, we are going to have to add 65 million tons to the ingot capacity of the steel industry by 1980 . . ."

In each of past 9 years the steel industry has had to spend on the average a third of a billion dollars more than it was able to obtain through depreciation, depletion and amortization.



NEW COKE capacity in the making. Scene is at U. S. Steel's Clairton Works where three coke batteries were rebuilt recently, making 17 since war.

ovens, improved cold strip mill facilities, a coiler for the hot strip mill and facilities for production of more high strength seamless casing.

Allegheny Ludlum has set aside $10 million for plant improvements, primarily to round out existing facilities.

In Atlanta, Ga., Atlantic Steel Co. announced plans for a 21-stand combination Morgan rod and bar mill in a $10 million expansion and improvement program this year.

Empire Steel Co. at Mansfield, O., expects to hit 300,000 annual tons capacity of strip before mid-year this year in the final step of a 5 year $20 million expansion.

Washington Steel Corp., Washington, Pa. will expand its facilities through the installation of a second Sendzimir (cluster) cold-rolling mill at an estimated expenditure of $2.6 million this year.

Western Outlays

Crucible Steel Co. plans some $5 million for expansion in 1955. Some portion will be to increase warehouse facilities. This is in addition to the $4.5 million plant at Midland, Pa. for the production of grain oriented silicon sheets, announced earlier.

In the West, Bethlehem-Pacific is building a new fabricating works in Torrance, Calif. near Los Angeles for heavy duty work. Cost between $4 and 5 million with completion estimated at latter part of this year. A new galvanizing unit for the Los Angeles mill has also recently been started.

Columbia-Geneva Div. of U. S. Steel is constructing a new pipe mill at Provo, Utah, where pipe production for the West will be concentrated. Pipe operations in Los Angeles and San Francisco are being discontinued.

Kaiser Steel recently completed an $8 million tinplate mill program at Fontana.

Colorado Fuel & Iron Corp. is spending "several million" for expansion and improvement at its Wickwire Spencer Div. The program includes enlarging open-hearth furnaces from 110 to 170 tons per heat.

EXPANSION

CAPITAL GOODS: Outlook Good

Gradual downturn reversed . . . Outlays for new plant and equipment will rise 1 pct over '54 . . . Optimism over sales prospects a factor . . . Utilities, commerce lead way.

◆ TOTAL BUSINESS outlays for new plant and equipment in 1955 will rise about 1 pct above last year, but manufacturers will spend about 3 pct less this year. Overall, demands for ferrous and non-ferrous metals for plant and equipment will be strong.

First quarter of this year will mark the end of the gradual downturn which has been in progress for some time. Expenditures should begin to rise slowly, according to the annual survey of business anticipations for capital outlays by the Securities and Exchange Commission and the U. S. Commerce Dept.

Businessmen also expect a healthy 5 pct increase in sales over 1954, the survey shows.

Investment programs of public utilities and commercial companies show the greatest expected strength dollarwise in 1955 with scheduled increases of 4 and 7 pct, respectively, and sales gains of 8 and 6 pct. Gas producers planning large expenditures for new pipeline construction, and electric utilities anticipating continued heavy outlays for new line construction, will account for a good part of utility expenditures in 1955.

Nonferrous metals companies will register slight gains over 1954, but will not reach earlier levels.

Railroads, the survey shows, will continue to reduce their purchases of plant and equipment in 1955, as will mining industries. Electrical spending will be off.

Plant and Equipment Outlays

(Millions of Dollars)

	1954	1955	Pct Change
Manufacturing	11,038	10,704	— 3
Durable goods industries	5,091	4,879	— 4
Non-durable goods industries	5,948	5,826	— 2
Mining	975	898	— 8
Railroad	854	763	—11
Transportation, other than rail	1,512	1,495	— 1
Public Utilities	4,219	4,384	+ 4
Commercial	8,230	8,818	+ 7
TOTAL	26,827	27,063	+ 1

Plant and Equipment Outlays, Selected Industries, 1952-1955

(Millions of Dollars)

	1952	1953	1954	1955	Pct Change
Primary iron and Steel	1,511	1,210	754	808	+ 7
Primary nonferrous metals	512	412	246	278	+13
Electrical machinery and equipment	386	475	439	435	— .9
Machinery, other than electrical	701	797	694	737	+ 6
Transportation, including motor vehicles	1,066	1,169	1,486	1,235	—17
Railroad	1,396	1,311	854	763	—10.6
Transportation, other than rail	1,500	1,565	1,512	1,495	— 1
Public Utilities	3,887	4,552	4,219	4,384	+ 4

INTERNATIONAL

Russia: A Paradox of Production

Managers strive for production within framework of strict controls . . . Initiative demanded despite bureaucratic maze . . . Markets, materials, wages and hours prescribed . . . Failure means Siberia—*By David Granick.*

◆ OUR USUAL stereotype picture of the operation of Soviet industry is that of a monolithic system, minutely planned and controlled by a handful of Communist Party and Government officials.

Having this picture in mind, an American business executive may well be skeptical of the reports he reads of high Soviet production of metal goods, chemicals, fuels and power. Having an insight into the tremendous difficulties involved in running even a single company with a highly centralized management structure, he may flatly doubt that a whole economy can function when headed by a single highly centralized management.

Any such system must be inherently weak, unable to expand rapidly, and always ready to fall on its face if subject to pressure. If he is to explain away his skepticism as to these reports of high Soviet production by American experts, our American must fall back upon some such explanation as the "mystical" and "Asiatic" qualities of the Russian soul.

Divided Authority

The truth is, of course, that our stereotype of Soviet industrial management combines—like most stereotypes—much truth with a good deal more of fiction. The age-old administrative problem of centralization versus decentralization in management is one which plagues Soviet executives even more than American business men.

If we should form our opinion as to the independence and power exercised by plant management solely from formal statements in Soviet lawbooks and administrative codes, we would imagine that the director of a plant is a man with responsibility but no authority. Each factory receives from above both an annual and quarterly plan, which theoretically are "law" to the plant director. These plans describe the proposed quantity of production, its product-mix into different types and sizes of goods, and its quality.

The director is told what size labor force to hire and the number of workers in each category. His factory's wage scale is determined by national standards. His sources of supply and his markets are in the main spelled out in the plan; the same for the prices he pays for his raw materials and charges for his own production. The director may not buy new equipment of any size unless it is specifically mentioned in his plan. In addition, he receives a constant stream of instructions as to precisely how he must proceed in carrying out his plan.

Yet in reality the plant director has considerable authority and independence, and woe unto him if he does not use his own initiative to the utmost.

In the first place, the plant director plays a major role in the formulation of his factory's annual plan. For while the plan must be approved by a chain of higher bodies reaching to the topmost rung of the Government, the director is the man on the spot who has the first opportunity to make proposals. It is his right and responsibility to fight against what he considers poor planning and to appeal any adverse decisions.

Secondly, the plant director finds himself at the beginning of each year operating without any

Author David Granick is Associate Professor of Economics, Fisk University.

Wanted: Red Plant Manager

(Guts Required)

The U. S. stereotype that a Russian plant director is a man with lots of responsibility but no authority is not completely accurate. It's a job that takes guts. Theoretically the government sets up the plant director's production goals, tells him how many workers to employ, what to pay them, where to get his raw materials, how much to charge for the products he turns out.

But in reality the Red plant manager has much more authority than official regulations indicate. He plays a large part in formulating the "annual plan" for his plant and since it takes quite a while for these plans to be approved, there are actually long periods when he is operating almost completely on his own.

He must work within a complicated framework of laws, plans and administrative orders, but his main job is to get out production as efficiently as possible. The director who can't produce is quickly replaced. It's not a job for a timid man for there's always Siberia.

plan or with one which is grossly incomplete. Since this planless period sometimes lasts for six months out of the year, he has considerable leeway for making his own guess as to what his plan will finally turn out to be.

But even once the plan has been prepared and is in operation, the plant director considers it as consisting—at most—of a set of guiding principles. Certain elements are more important than others. The director expects that his use of current-repair funds for paying above-plan wages is an offense which will be winked at in higher circles if all else goes well. On the other hand, failure to meet the monthly production quota would be a serious matter. While the director is legally obliged to carry out his plan in all its aspects, he knows that his work will be judged according to a scale of different priorities.

Failure Disastrous

Indeed, the plant director is aware that it is even better to overfulfill priority tasks — e.g. quantity of output—and to underfulfill lesser tasks such as that of keeping production costs per unit to the planned rouble figure, than to precisely meet all the indices set forth in the plan. Bonuses and promotions go to the director who can overfulfill his plan; and what is called "overfulfillment" often necessitates violation of the plan in the less important areas.

Anything But Secure

Thus the director of an industrial plant is anything but a petty bureaucrat searching for security and finding it in obedience to a maze of regulations. Soviet directors are not appointed to obey rules, but to get out production of good quality and proper product-mix at a reasonable cost. The director who cannot produce is quickly moved on somewhere else. Plant management knows that there is no excuse possible for failure, and no excuse necessary for success. Plan, laws, administrative orders: they are simply a framework within which to maneuver. Security can only be found in insecurity.

PRODUCTION

PIPE: Cold Expand Seamless

National Tube Div. shipping first cold-expanded seamless pipe . . . Developed for large diameter pipe lines where extra strength is necessary.

◆ FIRST COMMERCIAL orders of cold-expanded seamless pipe are now being shipped from the Lorain (Ohio) works of National Tube Div. of U. S. Steel. The new pipe will be used in construction of a 24-in. gas transmission line that will extend across 250 miles of eastern U. S.

First of its kind in the industry, the Lorain expansion unit is designed to expand pipe in the size range of 16-in. to 26-in. outside diameter.

H. J. Wallace, vice-president of National Tube, said the new process maintains the complete reliability of seamless "walls without welds" and adds uniform strength with excellent weldability through the use of mechanical cold work.

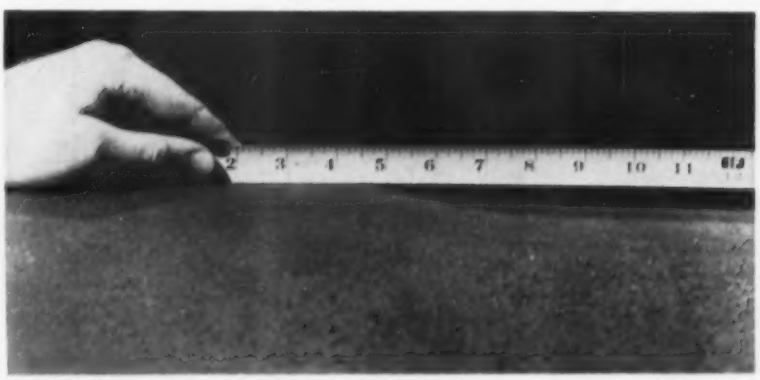
Machined Plug

"Builders of large diameter pipe lines have need for a product which possesses qualities of extra strength and highest degree of safety," he said. "The balanced properties of the new seamless fill that need."

Powered by a 500 hp motor, the mandrel bar forces the plug through the pipe at a rated 300,000 lb thrust, expanding the diameter of the pipe by the specified amount. A water soluble lubricant is applied to the inside surface of the pipe immediately ahead of the plug to reduce friction.

The process shortens the pipe by several inches, depending on the size of the pipe and degree of expansion.

WITH A 300,000 lb thrust, this cold expanding unit prepares to stretch the pipe's diameter.



THE EXPANDER is stopped inside a length of pipe to show the degree of expansion as the diameter is increased to 24 in. at National Tube's Lorain works. The unit is now in commercial production.

TRANSPORTATION

FREIGHT CARS: Order Upturn on the Way

Railroad revenues, car loadings gain . . . Traditionally precede new car buying . . . Pickup has already started in West . . . Need replacements for over-age cars . . . Scrap 65,000 annually—By W. G. Brookfield.

◆ THE STAGE is set for a pickup in freight car building. It's beginning to look as though the long drought car builders have been suffering through during the last two years may be about over.

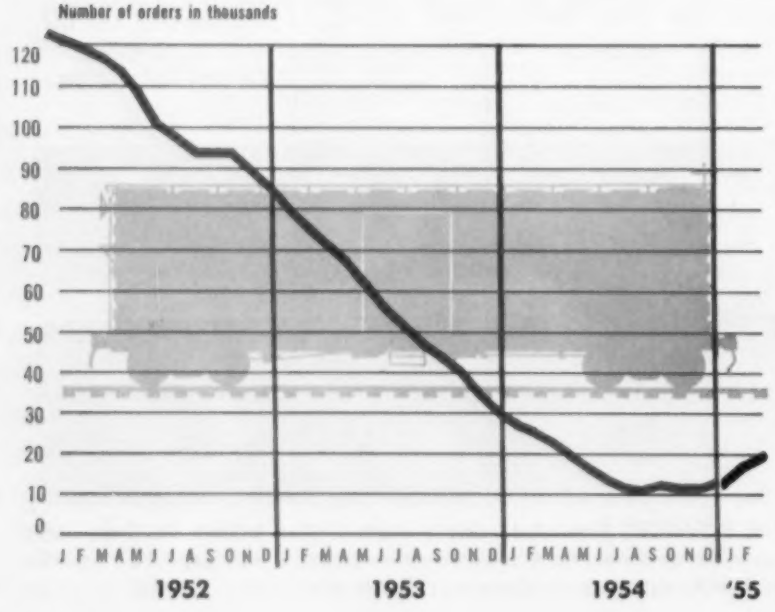
There's no telling when the break will come. But it could be soon. Order backlogs of the builders have been mounting slowly since third quarter of 1954. Orders placed last January were the highest in 2½ years. February may show another dip, indicating hesitancy of the railroads to take the big plunge.

Car builders are not exactly wild with enthusiasm at the moment. But they admit the rails have plenty of reason to step back into the market in a big way. For instance, freight car loadings have been trending upward since first of the year, in line with general economic recovery. Along with this, railroad earnings are up over last year.

Freight car loadings for the week ended March 5 increased 23,522 cars over the preceding week. Total loadings for the week were 658,975 cars, an increase of 68,399 or 11.6 pct above the corresponding week in 1954.

Association of American Railroads estimates net income of 130 Class I railroads in January at $52 million compared with $20 million in the same month in 1954. Total operating revenues in January were $753 million compared with about $749 million in January 1954. But operating expenses in January were $590 million compared with $627 million in the corresponding period of 1954.

Freight Car Backlogs: Is the Slump Over?



Traditionally, the railroads have reduced freight car buying when their revenues were off, as in 1954. But they usually can be counted on to reverse this policy when their income is on the rise. This has been the principal cause of the sharp peaks and valleys in freight car construction.

Another good sign is that the modest pickup in recent months has been due largely to orders placed by the western roads. The big eastern lines have not yet stepped into the market. Some authorities look for activity by the eastern roads in the near future.

The railroads have also improved their buying pattern from the steel mills for rail and track supplies. The pickup here, too, has come mostly from the west.

Foreign orders for cars of various types have been on the increase despite stiff competition pricewise from foreign builders. Orders in January from India, Brazil, and other foreign countries totaled 3402, plus spare parts for maintenance.

Need Replacements

Car builders say they could pick up additional foreign business with some assistance of the Export-Import Bank on money loaned to foreign countries. They feel some stipulation should be made that a certain percentage of such loans should be spent in the U. S. for capital goods.

From another angle, the rails are badly in need of replacements for over-age cars plus additional cars to increase the available supply. Authorities believe the railroads need 1.8 million Class I freight cars to maintain adequate service. It is estimated that we are close to being 100,000 units short of this goal at present. Govern-

ment officials are concerned over the problems that would arise in event of another national emergency.

To increase the supply of cars would require a major building program. The rails each year scrap some 60,000 to 65,000 cars. And these would have to be figured into any project designed to add to available rolling stock.

Steel Consumption Down

As in past years, the car builders probably would encounter supply problems, particularly steel, in the event of a major program in the near future. They would have to fight for their share of the finished steel products that go into the average freight car — sheets and strip, bars, plates, shapes, wheels, forgings, pipe, billets and slabs, and steel castings.

The railroads normally are good customers of the steel mills. On an average, about 7 pct of steel produced is sold, directly or indirectly, to the rails. In 1953, the roads consumed 5½ million tons of finished steel products. Last year they bought only about half that much.

The car builders could use the business. Fortunately, most of them have diversified their business over the years as a defense against sharp fluctuations in demand. At the same time, they have kept their car production lines intact, and are in a good position to produce in volume. The builders claim to have a capacity of 100,000 cars per year, providing they can get the materials they need.

A discouraging development for the car builders is the amount of building being done in shops of the railroads. For example, of the 5087 cars ordered in January for domestic consumption the regular builders received only 2749. The railroads will build the balance.

Deliveries Low

The last two years have been pretty rough on the car builders. Orders received averaged less than 3000 cars per month. Deliveries through 1953 were maintained at a fairly respectable level but only by chewing up an 80,000 car backlog which existed on Jan. 1 of that year. The backlog tumbled to under 30,000 cars by Jan. 1, 1954 and by first of this year was off another 14,000 units despite the pickup.

A meager 2000 freight cars were delivered in January compared with 2173 in December and 4944 in January 1954.

Of the nation's present stock of cars, between 40 and 45 pct are over 20 years old. Many are 30 years old and older.

The railroads themselves have problems. They are hemmed in by restrictions and regulations that make it difficult for them to move fast enough to meet competitive conditions. A special cabinet committee has undertaken a study of these regulations to determine whether something can be done to remove unnecessary restrictions and give the rails more freedom of action.

PIGGYBACK operation combines advantages of rail and truck travel and may be the answer to railroads' lagging shipments. Operation shown employs new 75 ft flat cars and is part of daily New York to Chicago Truc-Train service started Mar. 3 by Pennsylvania RR.

Okay Fast Write-off

Railroad trackage, rail passenger cars, and oil refining plants are to be built or expanded by three firms with new fast tax amortization certificates from Office of Defense Mobilization.

Central Pacific Ry. Co., part of the Southern Pacific system, gets an 85 pct allowance on the projected spending of $38 million for trackage. In particular, the company will build a rock fill roadbed across Great Salt Lake, to accommodate a double-track line.

Union Pacific R. R. Co., Omaha, has an 80 pct allowance on $8 million to be spent for passenger cars.

Gulf Oil Corp., Port Arthur, Tex., will invest $29 million in oil refining facilities. Its write-off allowances include 45 pct on $7.7 million and 55 pct on $21.3 million.

ODM now figures its tax certificate total at $29.8 billion.

Open New Ship Bids

American shipbuilders are invited by the government to bid on construction of a special new naval vessel with the primary job of hauling fully-loaded trucks and other vehicles.

The Maritime Administration has copies of the inviations to quote prices on the roll-on-roll-off vessel, called a vehicle cargo ship T-AK269. Bids are to be on a fixed-price basis and will be opened in Washington on June 14.

The Iron Age INTERVIEWS:

E. B. Germany

Oil Country Market Grows

Inventories dangerously low Lone Star president warns . . . Predicts substantial increase in demand through 1955 . . . Southwest cast iron pipe market good.

E. B. Germany
President
Lone Star Steel Co.

Q. *How do you expect oil country casing and tubing demand through 1955 to compare with 1954?*

A. I am confident the actual use of casing and tubing will be no less in 1955. I believe the production of these goods, however, will substantially increase this year provided increasing turbulence in world affairs dictates a return to maintenance of heavy inventories on the part of petroleum producers in the U. S.

Q. *Do you expect line pipe building to absorb considerable plate tonnages by mid year?*

A. There is some reticence on the part of pipe line builders toward new projects which might be affected by federal control of natural gas movements. And again, world affairs will be a significant factor in construction. In the event of increased tenseness, pipe line construction will be speeded up. Any future hostility will require pipe lines to carry a far greater share of the transportation burden than ever before. Pipe lines relieve other media of transportation and are not so susceptible to bombings in case of war.

Q. *Do you expect further expansion of tube capacity and line pipe production facilities to meet market demand?*

A. Not in the immediate future. Instead, I believe greater production will be gained through improvement of existing facilities.

Q. *Is the deepening of average well depths having an effect on oil industry demand for electric weld tube?*

A. Yes, but contrary to some opinions, the effect is in favor of electric weld goods. Great strides have been made in recent years in improving the quality of electric weld products. It is no longer an "orphan" of the industry but a product already come of age.

Q. *What is the immediate outlook for cast iron pipe, as you see it in the Southwest?*

A. The Southwest is one of the nation's fastest expanding industrial sections. Increased population translates itself into additional requirements for water and sewerage systems. Practically all of these use cast iron pipe almost exclusively. The immediate outlook is for increased cast iron pipe requirements.

Q. *Do you expect to see considerable expansion of natural gas output this year despite gas rate increases?*

A. The expansion of natural gas output will continue but probably will be affected by the uncertainty of the Federal Government's desire to control prices at the wellhead. On the other hand, the demand for natural gas at points considerably removed from the source of supply is extremely heavy, and despite the uncertainty of jurisdiction and its related regulations, I anticipate the 1954 expansion will be at least maintained and probably exceeded in some measure.

Q. *What effect will in-transit storage sites for tube have on the drilling companies' "normal" tube and casing inventories?*

A. When the practice of establishing in-transit storage sites was begun, it was felt that the drilling companies would be able to substantially reduce casing and tubing inventories, such action being predicated on the feeling that in-transit stocks would be sufficient to meet immediate requirements of the drilling companies. This feeling, along with others, combined to cause some of the companies to drastically reduce inventories during 1954. As we entered 1955, we noted that in-transit stocks were insufficient in quantity and sizes to meet urgent needs.

Q. *Despite the high drilling rate in 1954, it is believed that consumers accumulated heavy tube and casing stocks. Are these liquidated?*

A. The indications are that these stocks have been depleted to a dangerous level. The purchasing trend seems to point up the desire of consumers to maintain a safer margin of supply.

STEEL FABRICATORS: Outlook Good

Industry looks for improvement in second half . . . Prices firming after pencil-sharpening siege . . . Highway program behind current optimism . . . Shipments below '54 spring volume . . . Backlogs up—By *K. W. Bennett.*

◆ THE LAST 30 days has seen a resurgence in structural fabricating. Like spring weather it's coming and going in gusts but the trend is upward. Far enough up at this point for the forecasters to predict a better second half for the structural fabricating industry than first half.

With backlogs beginning to stretch, with delivery on wide flange structurals, light structurals, and plate moving out; with both wide flange and plate, as well as some light structurals from standard mills at June delivery; with fabricator prices giving some evidences of firming after the harsh price shaving of 1954; there is considerably more health in the picture than a quick glance would indicate.

For instance: The highway program, which is due to fill its sails in second half 1955, has been regarded as a white hope since January. That factor alone has been enough to boost the hopes of a number of firms for a considerably more secure second half than first. It's already been preceded by a growing spurt of state and local road building that has boosted inquiries for some firms as much as 15 pct ahead of the first three months of 1955.

Shipments High in '54

Buttressing the growing highway demand, is an advancing number of small industrial and commercial jobs. A firm with a 10-15 pct advance in order taking over the first three months of last year in the first three months of 1955 told THE IRON AGE last week that the surprise element to their contract men has been the strength of commercial and industrial building. In this particular case, though it's by no means the rule at this early stage, industrial and commercial inquiries were outpacing the road and highway ordering.

In 1954 the structural fabricating industry shipped 3,135,525 tons, the highest figure since the all time record established in 1929, when the industry total hit 3,305,525 tons. If there was gloom in the industry, it was due to the fact that as shipments went out, a sinking amount of new business was coming in to sustain the backlog. Total bookings sank from 2,786,591 tons in 1953 to 2,509,817 in 1954, as compiled by the American Institute of Steel Construction.

Besides this fabricator price estimates were cut to the bone during that year, though they'd already begun to slip in second half 1953. There is a firming in prices, though many fabricators will deny it is happening this soon.

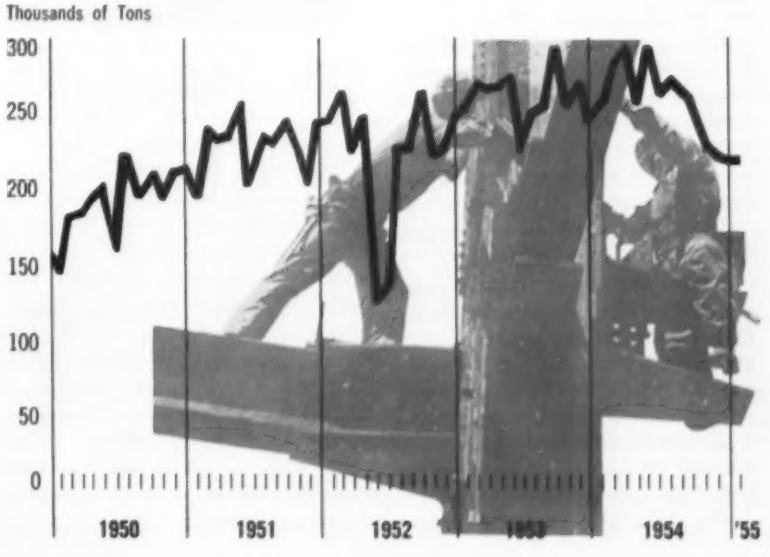
On a tonnage shipment basis, fabricators currently report being anywhere from 15 to 25 pct below the strong volume of opening 1954. But in opening 1954, the new order volume was slipping, and continued to do so for a good share of the year. In the same period of 1955, new orders are advancing at an increasing rate.

Backlogs Increasing

The larger firms are the quickest to sense the growing optimism. But smaller firms have already an inkling of the fresh wind that's blowing. Mill men are confident that a portion of the stronger fabricator buying can be traced to a laying in of inventory. Not a great deal, and probably more in plate than other grades, but there is inventory building — a proposition regarded as not worth considering back in December. Plate deliveries at one mill were extended by 3 weeks.

If any steel item going to the fabricators is still dragging its feet, it's heavy standard structurals.

Fabricated Structural Steel Shipments



MANUFACTURING

STAMPERS: Production Up

But higher costs, smaller margins cut profits . . . Automation helps big shops . . . Industry about 8 pct ahead of 1954 . . . 90 day backlogs—*By T. M. Rohan.*

◆ THE STAMPING industry is weighing the benefits of longer backlogs and increased production rates against smaller job profit margins.

Level of production is now paralleling the basic steel and auto industries as well as appliances, radio and TV. The level of operations is up and still climbing. Level of inquiries is also substantially greater and tonnage output about 8 pct ahead of 1954 averages, according to Sam Morrison, President of Pressed Metal Institute and Morrison Steel Products, Buffalo.

The sixth annual technical meeting of PMI in Cleveland last week "marks the turning point in our growth," Mr. Morrison told THE IRON AGE.

Dollar Volume Static

"Registration this year is 450, biggest in our history, compared to 275 last year. We confidently expect 600 next year. People are beginning to take cognizance of the Pressed Metal Institute as the speaking voice for the industry," Mr. Morrison said.

Dollarwise the volume of the stamping industry is now about even with last year but backlogs have shot out as far as 90 days in some cases compared to 30 day average then. Stampers unfortunately are now producing at prices quoted three months ago so must crowd for every dollar.

Prices are much tighter and stampers do not relish the prospect of price rise in steel this year. Last year they absorbed a $5 increase. If there's another one this year they probably will have to absorb that too, although they are not in as good a position as last year.

The highly specialized and larger stampers are in good shape these days but mortality is running high among job shop and smaller operations. Bigger ones still have not expanded to the point where they can attempt any research or investment on items such as titanium stamping so the majority will wait until knowledge and techniques are developed elsewhere by larger industries or the government.

Biggest new items in the stamping field these days are newer, high speed use of automation and growth of cold impact extrusions.

Cold impact extrusions are becoming high volume products where three factors are necessary: a micro finish, allowance for trim, and different wall thicknesses. This technique of displacement of the metal has now advanced to the point where machine tolerances and finished finishes can be obtained at much lower cost provided there is sufficient volume of about 100,000 to amortize tools. Steel can also be conserved since blanks are cut to exact size necessary. The technique is applicable to any symmetrical deep drawn shell, especially where close tolerance and machine finish is essential.

Biggest new field for the stamping industry is rapidly becoming conversion of small castings.

Biggest tonnage markets for the stampers these days are automotive, appliances, radio and TV sets and agricultural machinery parts.

A New Carport in the Making

EXPANDED metal is used in new Oklahoma City carport.

◆ EXPANDED metal found a new roll in construction of a 675-car "carport" in Oklahoma City.

A total of 294,000 sq ft of Steelcrete, expanded metal reinforcing material supplied by Wheeling Corrugating Co., Wheeling, W. Va., was used in the structure's precast reinforced concrete columns, ramps and decks.

The open deck garage, including 180,000 sq ft of usable floor space and 8000 sq ft of shop space on the ground floor, was built for $600,000. This is slightly less than $800 per parking space, excluding areas devoted to shops.

Expanded metal is made from solid sheet that has been slit and stretched on precision machines to form a one-piece sheet with uniform diamond shaped openings. No metal is removed during the expanding process and the expanded metal may cover ten times the area of the solid sheets from which it is made, depending on the gauge and diamond size.

A number of different sizes, weights and cross sectional arcs were used in constructing the city's multiple level parking garage designed to help ease parking problems.

Research:

$1 million center launched by General Dynamics Corp.

Construction will begin this spring on a $1 million research and development center at Electric Boat Div. of General Dynamics Corp., Groton, Conn. The program is being carried out in conjunction with the company's scientific development of nuclear submarines and aircraft.

The center will be housed in a new three-story brick building adjoining the plant's iron foundry. The addition will add 30,000 sq ft of floor space to the plant with 14,000 sq ft made available in the renovated foundry.

Two major acquisitions for the center will be a high-pressure test boiler and a high-pressure, high-temperature water flow facility.

Specialized equipment will include testing gear for electronic, hydraulic and electrical systems. There will also be improved facilities for metallurgical analysis and testing for shock, sound, and vibration. Where not available elsewhere, special equipment will be designed and built by the company.

Step Up Output

Increased nationwide use of gas appliances and home heating equipment promises to keep gas meter production at a high level.

According to latest industry figures, gas utilities expect to add about 1.2 million homes for gas heating in each of the next 3 years. This is in addition to more than 25 million residences now using gas for heating and cooking purposes.

To meet stepped up demands, Rockwell Manufacturing Co., Pittsburgh, has increased production and testing facilities at three plants.

At DuBois, Pa. 19,000 sq ft of additional floor space has been installed for production of large unit meters. At nearby Sykesville, an 11,000 sq ft structure has been added. Industrial meters ranging from 800 to 10,000 cu ft capacity are produced at both sites.

New construction at the firm's Norwalk, Ohio, plant has increased gas regulator production. In addition, a new laboratory for regulator development and testing has been completed.

Set Power Goal

Government has set a new expansion goal for electric power transmission lines and interconnection lines with national defense applications.

The goal is an open-end one on which no time limitation or dollar ceiling is placed. It is intended specifically to meet needs of the military forces, Atomic Energy Commission, and defense-related industries. Rapid tax amortization applications from builders of the lines will be considered by the government, but clear evidence of the defense-connected use intended must be shown.

Applications for tax write-off certificates will be reviewed by the U. S. Interior Dept., the agency which will provide full information on the goal.

"You'd be surprised how it cuts down on manhours."

Add New Warehouse

Republic Steel Corp. will add a 112,000 sq ft warehouse to existing facilities at Canton, O., to enable its Berger Div. to give faster delivery on a wider variety of kitchen cabinets. Construction will be completed in June.

The new facility was necessitated by the seasonal nature of the kitchen cabinet demand. The warehouse will give the company an opportunity to build up inventory in slack months for faster service in times of peak demand.

New Plans Underway

Armco Drainage & Metal Products, Inc. plans a $500,000 development program at its Washington Court House, Ohio, fabricating plant. Construction will begin shortly.

Plans call for an additional 44,000 sq ft of working space and new fabricating equipment. The installation is the largest of the company's 49 drainage plants in the U. S. and Canada. It turns out prefab metal buildings and drainage structures.

Building materials for enlarging present plant installations will be of steel fabricated by the company.

Push Modernization

Westinghouse Electric Corp. will spend more than $1 million to modernize production facilities of soft drink bottle dispensers, dehumidifiers and water coolers at its East Springfield, Mass. Electric Appliance Div.

The allocation makes a total of more than $8 million to be spent on plant modernization in recent months.

DEFENSE

FALCON: Deadly Plane Stalker

New missile has electronic seeing eye . . . Launched from interceptor planes, it follows maneuvering air targets and hits hard . . . Tighter U. S. defense seen.

BIRD DOG of the air, new Falcon has electronic brain that stalks prey relentlessly. "Seeing eye" knocks out target no matter where it runs.

◆ LATEST AIR-TO-AIR guided missile, the new Falcon has a built-in seeing eye that keeps it dead on maneuvering targets and promises to tighten defense of continental U. S.

Just taken from under wraps by the Air Force, the 6-ft weapon is designed for launching against enemy bombers by high speed interceptor planes. Integral electronic controls receive guidance data and keep the Falcon on a collision course with its target.

Follows Its Target

The missile has been under development by the Hughes Aircraft Co. at Culver City, Calif., since 1947. It will soon be issued in quantity to all-weather interceptor units included in the continental defense system.

Asst. Air Force Secretary Trevor Gardner said the Falcon can bring down any enemy bomber—usually with one hit.

Material released indicates that automatic tracking devices take over the whole interceptor mission once the launching fighter is brought within radar range of the target. Electronic controls guide the plane towards its target. When the enemy is 3 to 5 miles away, the Falcon is automatically launched and commences its stalking operation at speeds faster than sound.

If the target changes course, the Falcon turns with it, continuing the pursuit until it has hit home. Weighing about 100 lb, the Falcon is relatively small but will still carry a deadly punch and is expected to be highly effective in keeping big bombers away from U. S. targets.

See No Defense Possible

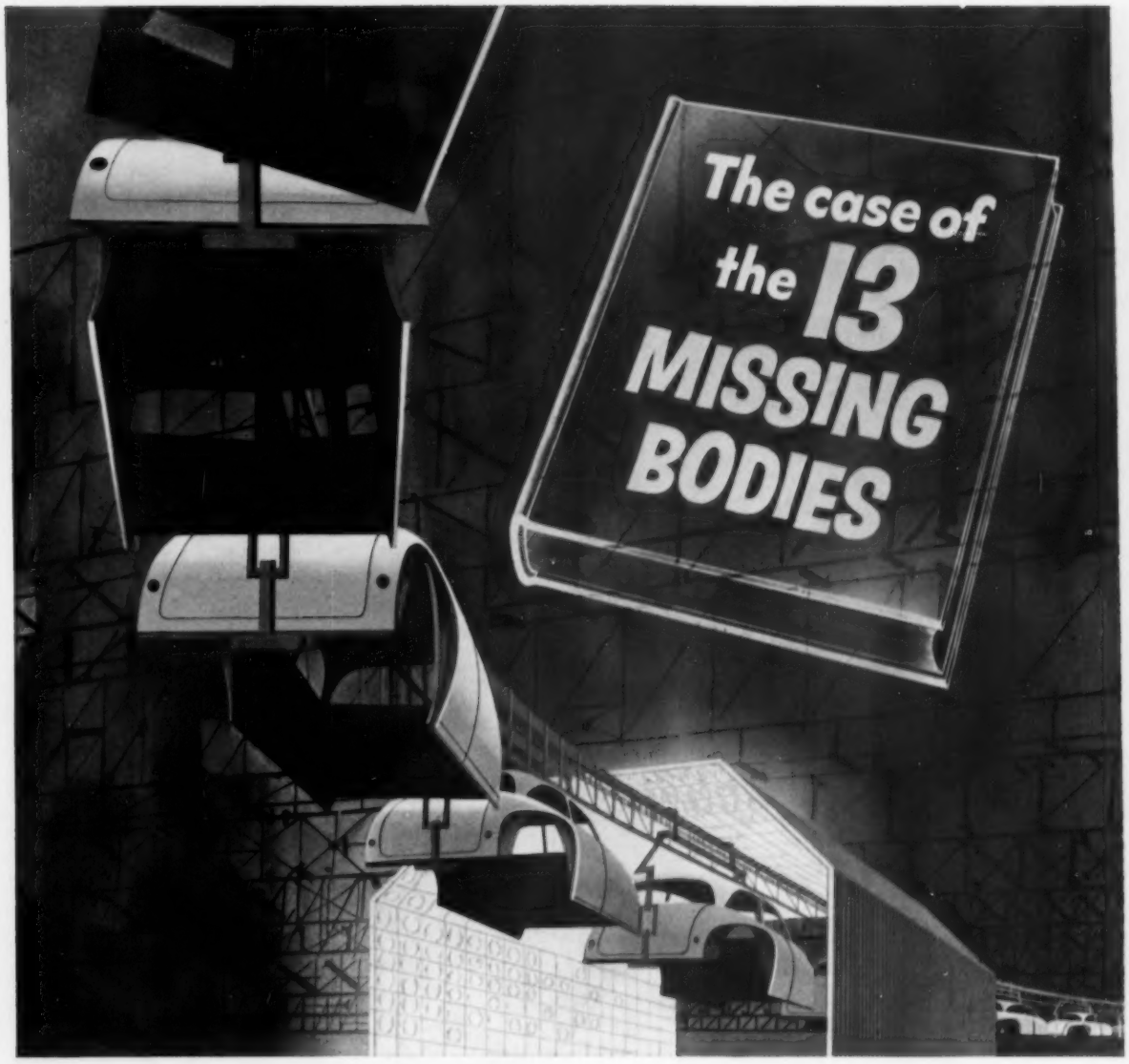
Another new Air Force missile, the Rascal, will have a different mission. Still being developed, it is intended for delivery by U. S. bombers against distant targets. It will carry a nuclear warhead.

Neither of these weapons will have the range or potential impact of three intercontinental missiles being built for the Strategic Air Command. These three—Snark, Navaho, and Atlas—will permit ground-to-ground attacks against targets 5,000 miles or more from the U. S.

The Atlas is a rocket-driven ballistic missile which could be the decisive weapon in a future war. Its designed speed is so great that there is virtually no defense against it.

KILLING BLOW is struck by the Falcon, which is equipped with electronic controls that are said to assure hits every time.

WINDING smoke trail traces the path of self-powered Falcon as it seeks out plane that has tried to elude the high-speed missile.



How Correct Lubrication solved it—saved $1,300 per hour!

They moved along in an endless line—sleek, brightly painted bodies on dress parade. But somewhere along the line there was trouble—costly trouble. They knew the cause, but all their efforts to find a cure just added up to—*13 missing bodies!*

The culprit was grease in overhead conveyors leading to drying, baking and bonderizing ovens in a large auto body plant. Oven heat caused the grease to "separate." Part of it dripped on the bodies, ruining some finishes; the residue stiffened, slowed the conveyors. As a result, production was cut 13 bodies an hour—a loss of $1,300!

A Socony-Vacuum man, called in to make an analysis of the plant, heard of this trouble. He asked one of his staff lubrication engineers to investigate. Working with plant personnel and technicians from a Socony-Vacuum research laboratory, he studied the problem, recommended a change from grease to a special oil, plus new application and cleaning methods. This cure worked—saved $1,300 an hour!

This case was taken from our files. It shows how *Correct Lubrication* operates to increase production—cut costs. Why not get such a lubrication program for *your* plant?

SOCONY-VACUUM

SOCONY-VACUUM *Correct Lubrication*

FIRST STEP IN CUTTING COSTS

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Here's high production — low cost carbide planing at the Beloit Iron Works, Beloit, Wis.

This GRAY OPENSIDE PLANER CUB is running 300' per minute, day in — day out, carbide planing packing strip holders for suction rolls of paper making machinery.

BETTER BE QUICK!

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Planer jobs don't grow old on a GRAY!

Ever see a planer running wide open, day after day at 300' per minute? That's the pace of a new GRAY — the pace that makes your old planer look really old.

Why should you be interested?

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Report To Management

There Won't Be An Auto Strike

You can figure there won't be an auto strike this year. Walter Reuther will continue his GAW tub-thumping right up to negotiation time and the auto industry will seemingly keep up its square-jawed opposition, but when discussions reach the smoke-filled room stage here's what will happen:

The automakers will give the union a highly watered down version of the guaranteed annual wage. It'll be enough so that Reuther can claim victory, but limited enough so automakers can say they didn't really give in on GAW—that all the union won was a mild kind of company unemployment insurance.

Odds are the settlement will be for more than a one-year period. The automakers want to be assured of a long period of uninterrupted production—that's the reason the last contract was for 5-years. Also the auto industry doesn't want to act as whipping boy every year the way the steel industry has.

These are the factors pressuring a peaceful settlement: Reuther, despite all his bluster, knows an all-out guaranteed annual wage is economically unfeasible. If he gets enough in the way of concessions to make it seem as though the autoworkers are doing better than anybody else, he'll be satisfied. And the automakers want to escape a strike even more than the union. The fierce competition between General Motors and Ford virtually forces whichever company the UAW tackles first to be concession-minded. They can't risk losing business to their competition.

With prospects of an auto strike fading, it means the most serious potential threat to the '55 business revival is on the wane.

New Plant, Equipment Spending to Rise

Late last fall—even after the business pickup was apparent, there were a lot of pessimists who fingered new plant and equipment expenditures as the soft spot that might stop the economic recovery. According to most forecasters, outlays for new plant and equipment in '55 were supposed to continue the decline that started late in 1953.

But now it's obvious this will not be the case. Survey by the Office of Business Economics and the Securities & Exchange Commission indicates business concerns will spend approximately $27 billion on new plant and equipment during 1955—up 1 pct from 1954 levels. During the second quarter, capital outlay rate is expected to be running at a nearly $27.5 billion per year level compared with a little better than $26 billion pace in the first quarter of this year.

According to the survey, outlays by durable goods manufacturing industries will drop 4 pct from last year's $5 billion-plus level. But this could be a hooker. The business improvement has come on with such a rush that a lot of hard goods manufacturers may find that they'll be forced to expand or modernize production facilities to keep up with demand.

Sales Will Top '54 by 5 Pct

The OBE-SEC survey also reflected the general optimism that has swept business. Prediction is that sales will be up 5 pct from '54.

And there was more good statistical news from Washington last week. Federal Reserve Board reported industrial production in February rose two points to a 133 rating—highest it's been in 17 months. A year ago at this time the FRB Index registered 125.

Slight Pickup in Defense Spending

For the short term you can figure defense spending will be slightly above what it was during the first 7 months of fiscal '55 (July '54-January '55). Defense expenditures during that period were running at a $39.8 billion per year rate while the budget estimate for all of fiscal '55 was pegged at $40.6 billion. This means that if the budget estimate is correct, defense spending during the first 5 months of this year will be at better than a $41.6 billion per year clip.

INDUSTRIAL BRIEFS

New Plants . . . Pennsylvania Salt Mfg. Co.'s new Delaware, Ohio, plant is now producing metal processing chemicals, corrosion resistant cements and coatings, and variety of household products including lye and insecticides.

Together with a similar newly-constructed plant at Chicago Heights, Ill., the plant will serve as a blending, packaging and warehousing center for the company's rapidly growing East-Central market area.

Exclusive Representative . . . Production Service Co., Cleveland, has been appointed exclusive representatives of the Hartford Special Machinery Co.

Southern Site . . . Wonder Building Corp. of America will open a fabricating plant in Birmingham, Ala. The new facilities will supplement the firm's present Chicago installations.

The company manufactures trussless, pre-fab steel buildings for industry and agriculture. Estimated erection cost for the firm's steel shell "Wonder Building" averages 75 pct less than normal mason, brick or frame construction.

Announcement . . . Acquisition of all assets, U. S. and foreign patents, goodwill and the Dwight-Lloyd research facilities of Sintering Machinery Co., was recently announced by the McDowell Co.

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Purchases . . . Reon Resistor Corp., Yonkers, N. Y., has purchased the total assets of Columbia Resistors, Inc., Pearl River, N. Y.

District Office . . . Whiting Corp. (Canada) Ltd., has opened a new district office at 660 St. Catherine St., West, Montreal.

Contract Awards . . . Production contracts for instrument products totaling over $15 million have been awarded Grand Rapids Division of Lear, Inc.

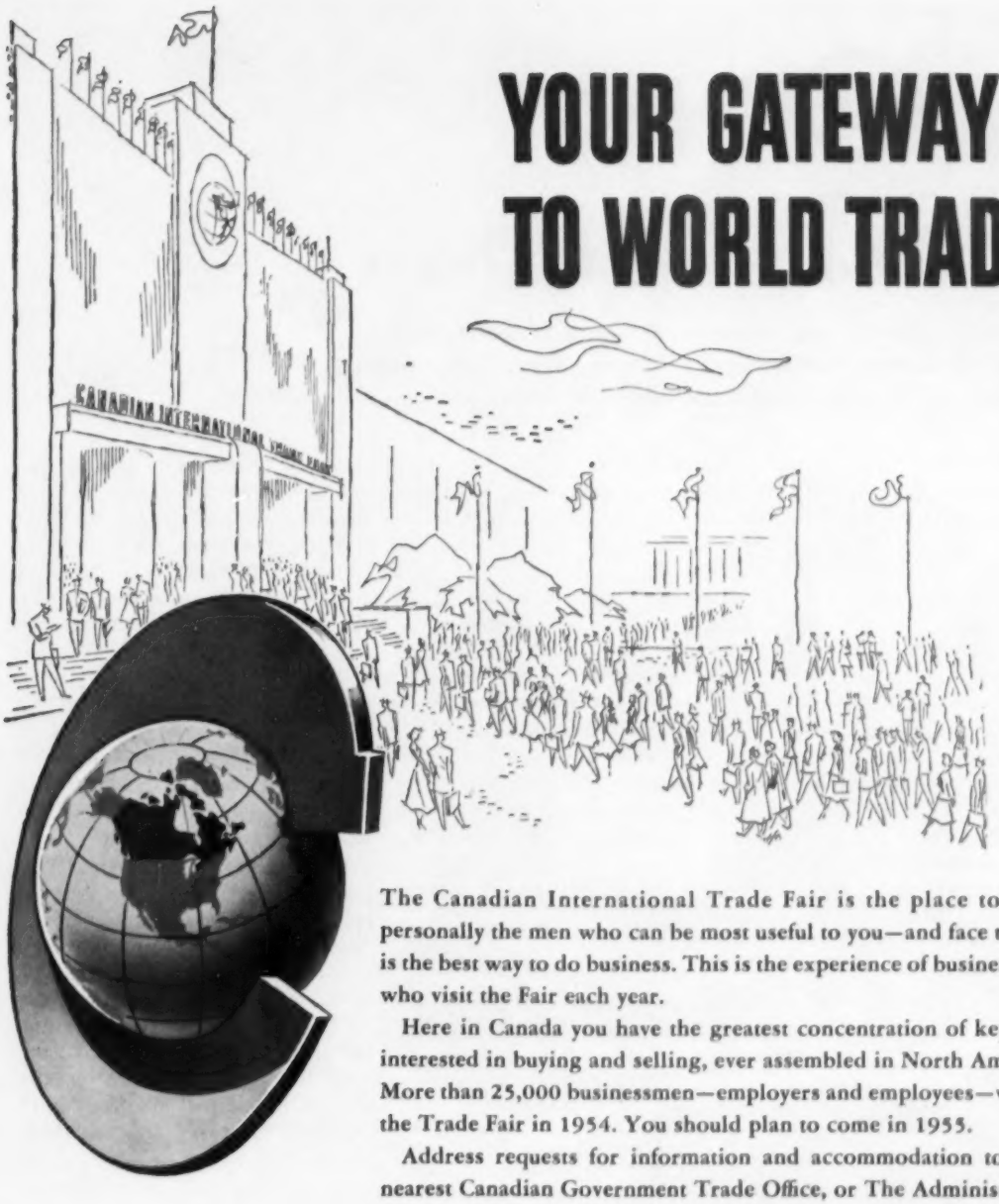
Controlling Interest . . . SKF Industries, Inc., Philadelphia, has acquired the controlling interest in Tyson Bearing Corp.

Formal Opening . . . Opening of a new plant to fabricate metal dies and molds for shaping plastic parts, was announced recently by Acar Broach Co., Detroit.

Dissolved . . . Schneider Mfg. Corp., Muncie, Ind., subsidiary of Westinghouse Electric Corp., is being dissolved to form the hydraulic drives department of the company's gearing division.

World's Largest . . . Erection has been started on the world's largest slab-reheating furnaces at the Weirton Steel Co. plant in Weirton, W. Va. The three new furnaces will have a normal capacity to reheat 200 tons of steel slabs to rolling temperature per hour.

Installation . . . Univertical Foundry & Machine Co., has completed installation of five one-ton capacity Detroit Rocking Electric Furnaces for casting and recasting of nickel anodes, with a capacity potential of 7500 lb per hour.



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The Canadian International Trade Fair is the place to meet personally the men who can be most useful to you—and face to face is the best way to do business. This is the experience of businessmen who visit the Fair each year.

Here in Canada you have the greatest concentration of key men interested in buying and selling, ever assembled in North America. More than 25,000 businessmen—employers and employees—visited the Trade Fair in 1954. You should plan to come in 1955.

Address requests for information and accommodation to your nearest Canadian Government Trade Office, or The Administrator, Canadian International Trade Fair, Exhibition Park, Toronto, Canada.

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AUTOMOTIVE ASSEMBLY LINE

Trucks Get Full Styling Treatment

Competitive market prompts new styling . . . Wraparound windshields, hidden running boards new truck features . . . More power, lighter weight in expanded GMC line . . . See growing market—*By T. L. Carry.*

◆ STYLING AND DESIGN have received the bulk of attention in the 1955 truck models introduced last week by General Motors Coach and Truck Div. but engineering developments have not been neglected.

This year the division is offering 128 basic models, including 74 entirely new units which more than doubles the number of models offered in 1954.

Styling combines the lines of a passenger car with the more functional design customarily seen.

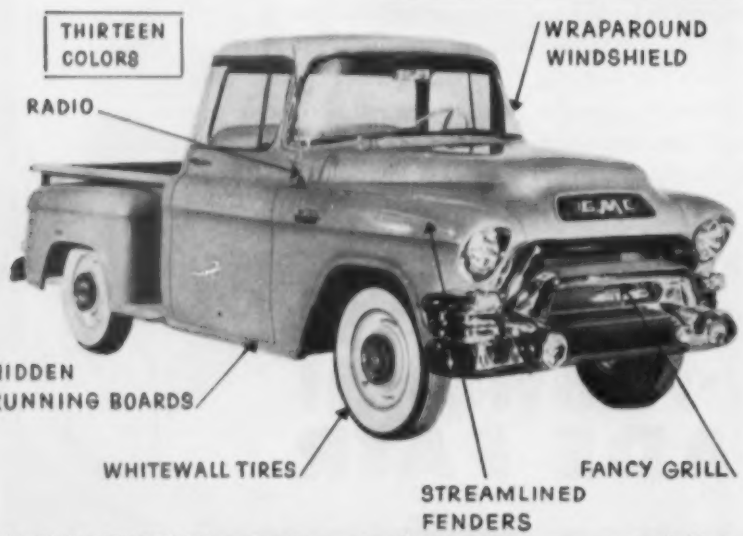
Wraparound windshields along with a lower cowl and hood give the driver more visibility. A wider and lower cab accentuates the lower silhouette of the vehicle.

Lighter Diesel . . . Other styling changes include hidden running boards, a streamlined grille and cadet peaks over headlights and windshields.

Two new V-8 engines and a lighter weight Diesel power unit bring to 11 the number of engines offered by the division in its 1955 line. Aluminum parts have replaced heavier components in the new 6-cylinder Diesel which develops between 175-185 hp.

Other new engineering developments include a "hold" position for the 8-speed Hydra-Matic transmissions in medium and heavy duty trucks.

Previously used only in heavy duty models, the "hold" position prevents upshifting beyond the gear in which it is locked. Thus the driver is able to use the position as an engine break. It also causes all downshifts to occur at vehicle's maximum speed, letting the engine operate at more rpm and obtain its maximum hp.



ALL THE COMFORTS and refinements of a passenger car are available in new truck lines. No longer is the driver's comfort incidential. His sense of color is appealed to in new, dramatic combinations.

Of Growing Market . . . R. C. Woodhouse, general truck sales manager for GMC, forecast a domestic truck market in 1955 in the area of 950,000 units. He set GM's 1955 sales goal at 100,000.

Predicting that truck sales volume would triple in the next 20 years, P. J. Monaghan, vice-president of General Motors and division manager, said that there will be 30 million trucks on the road by 1975. Monaghan forecast that the upswing would start this year with the replacement of trucks sold at the end of World War II and that the rate of replacement would increase with the design and engineering developments that will be made.

Hardtop Sedan . . . GM passenger car divisions last week introduced the new 4-door hardtop sedan. Although the weight of the new model is virtually the same as a standard sedan, several structural details had to be redesigned.

The center post which reaches only to the belt line was made much sturdier. The base size of the door support was greatly increased. The roof was lowered substantially and the frame strengthened, giving it convertible stability.

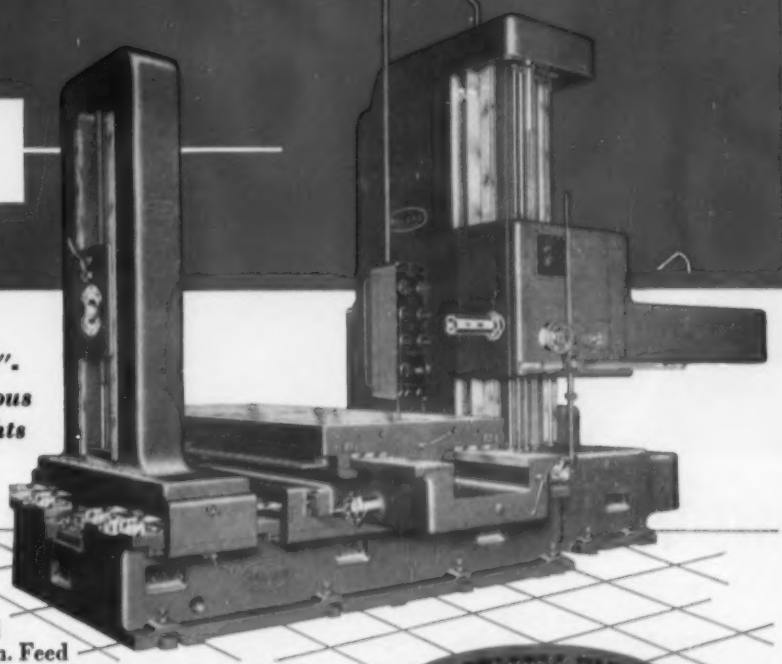
Turn Page

outstanding DESIGN and PERFORMANCE are incorporated

in the new . . .

BULLARD HORIZONTAL BORING, MILLING and DRILLING MACHINES

MODEL 75



Available in 3"- 4"- 5"- spindle sizes with various bed lengths, post heights and table sizes.

PENDANT CONTROL – complete machine control from a movable pendant station. Feed and speed rate selection, directional feed and traverse engagement of the spindle, head, table and saddle, spindle rotation and operation of head binders are accomplished from the Pendant.

BOTH SCREW AND RACK FEED – to the spindle provide smooth, steady screw feed for boring and sensitive hand feed for small drilling and tapping.

SPEED RANGES – 9.5 to 2000 R.P.M. on 3" and 5.83 to 1200 R.P.M. on 4" and 5" sizes, meets any machining requirement.

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MIDVALE "PUTS TEETH" IN MARINE DRIVE

This 159½" I. D. gear tire for the reduction gear in a high speed marine drive is receiving the rough machining at Midvale. From pour to machining it has been built for toughness . . . higher resistance to wear.

Toughness of forgings at Midvale is achieved by using only the finest part of the ingot originally poured. Experienced forgers shape it up for rugged service using a 6,500 ton hydraulic forging press. Heat treating cycles based on Midvale's long experience are thoroughly followed to produce the maximum in mechanical properties. Final machining is done on equipment capable of handling rough or finish machining on practically any size product.

At Midvale the final gear tire represents only a fraction of the original ingot—73,500 pound ingot was required to make this gear tire which was 15,640 pounds in the rough machined state when shipped. This is one of the reasons Midvale gear tires . . . rings . . . roll shells are noted for their long life. Why Midvale forgings, whether 300 or 300,000 pounds are tough for extra service life and never failing performance. For forgings that last see Midvale first.

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MIDVALE

FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Mar. 19, 1955	186,657	25,866
Mar. 12, 1955	181,053	23,232
Mar. 20, 1954	130,295	24,600
Mar. 13, 1954	119,307	24,171

*Estimated. Source: *Ward's Reports*

Ford Stock:

Public sale now seems likely.

If non-voting Ford stock should go on the market, as seems likely, it will be offered by the Ford Foundation, not the Ford Motor Co. Purpose of the sale would be solely to diversify holdings of the Foundation, a Ford family philanthropic agency.

Won't Borrow

Although Ford will have spent more than $1,700,000,000 when current expansion plans are completed, it is believed that a bigger cash balance in the company's treasury and a high unit profit per car makes the expenditure possible without additional borrowing from outside sources.

However, both Chrysler and General Motors have expended large sums for expansion since the end of the war and both firms have found it necessary to go to outside sources for part of the money.

Spent Billions

Chrysler, for example, has spent $750 million for expansion since Jan. 1, 1946. Of this total the corporation borrowed $250 million from the Prudential Life Insurance Co. over a four-year period. The bulk of this loan is being used for expansion purposes and is repayable over a period of 100 years, although it can be paid off earlier if Chrysler desires.

In the case of General Motors, the corporation has spent $2,130,000,000 on new installations in the United States since 1946. The corporation found it necessary to raise $625 million of this total through a $300 million debenture bond issue in 1953 and a $325 million stock subscription program currently in effect.

Colors:

Three-tone combinations get special treatment

Demand for two and three tone paint combinations on new model cars has increased to the point where 25 pct or more of some makes are multi-tone combinations. Predictions that the demand will even pass that figure have forced automakers to find a way to paint two-tone fenders, for example, without the time-consuming and bothersome task of masking them.

Buick process engineers came up with an interesting solution to the problem by developing a metal shield about 6 in. wide that is held at right angles to the fender and fits snugly to the surface of the metal. Studs welded on the shield fit into holes in the fenders originally put there to hold the chromium trim. A locking device on each end of the shield holds it firmly in a horizontal position and assures a sharp paint line.

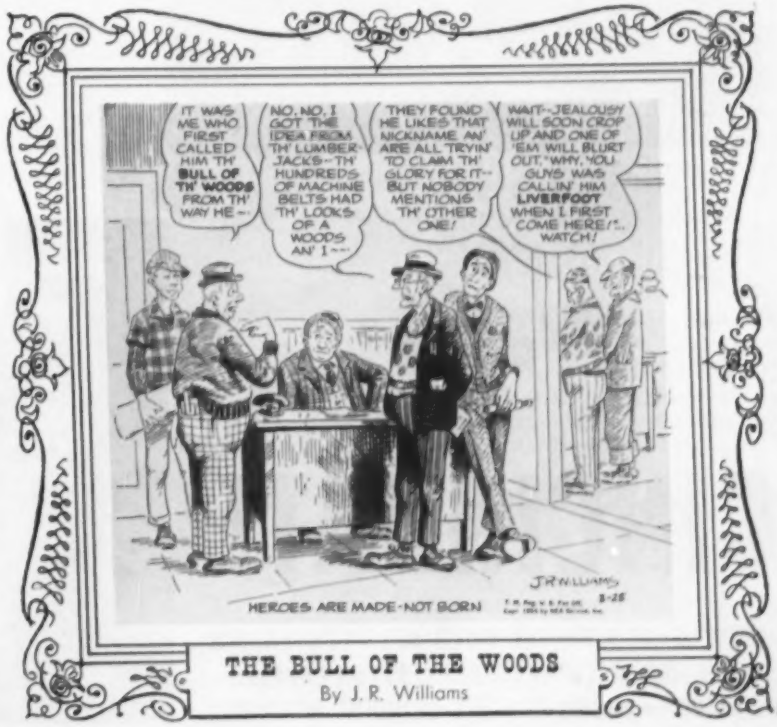
Top Half First . . . Buick is offering 15 different colors on its models this year in one to three-tone combinations so it is necessary to identify the colors desired on the fender by code. Code numbers are displayed on the conveyor hooks. The same information is also chalked inside the fender.

Strip Shields

As the fender proceeds through the down draft spray booth, the operator sprays the top half of the fender with the desired color. The lower half is then painted. After drying in an oven, the fender is ready for the assembly line.

At the end of the day, the paint shields are placed in a stripper where all paint is removed and the shields are ready for the next day's operations.

To avoid dust from the conveyor belt falling on a freshly painted fender, Buick has developed a counter weight for the conveyor hook which suspends the fender outside of the path of falling dust. Considerable refinishing expense is avoided through the use of this system.

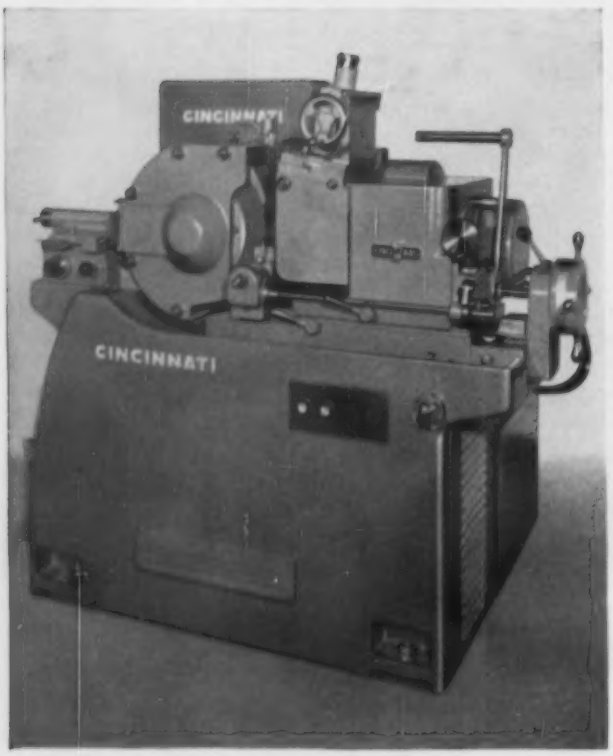

IT WAS ME WHO FIRST CALLED HIM TH' BULL OF TH' WOODS FROM TH' WAY HE ~
NO, NO, I GOT THE IDEA FROM TH' LUMBER JACKS ~ TH' HUNDREDS OF MACHINE BELTS HAD TH' LOOKS OF A WOODS AN' I ~
THEY FOUND HE LIKES THAT NICKNAME AN' ARE ALL TRYIN' TO CLAIM TH' GLORY FOR IT ~ BUT NOBODY MENTIONS TH' OTHER ONE!
WAIT ~ JEALOUSY WILL SOON CROP UP AND ONE OF 'EM WILL BLURT OUT, "WHY, YOU GUYS WAS CALLIN' HIM LIVERFOOT WHEN I FIRST COME HERE!". WATCH!
J.R.WILLIAMS
HEROES ARE MADE-NOT BORN

THE BULL OF THE WOODS
By J. R. Williams

You'll find New Profit Possibilities

in NEW CINCINNATI FILMATIC

No. 0 CENTERLESS GRINDERS



CINCINNATI FILMATIC No. 0 Centerless Grinder. Catalog No. G-640.

In the small parts precision grinding category, a substantial profit potential will be found in the new CINCINNATI FILMATIC No. 0 Centerless Grinder. Exclusive Cincinnati features, based upon 33 years of centerless experience, have been retained: Filmatic grinding wheel spindle bearings; "bed-rock" mounting of grinding wheel spindle; simple, direct truing of wheels. And now Cincinnati offers new advantages such as extra low maintenance; an extra measure of production with handwheel selection of infinitely variable regulating wheel speeds; higher quality finish and closer limits of accuracy than ever before. Catalog No. G-640 contains the complete story. Write for a copy today.

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Eased Tension Won't Slow Defense

Capitol sees peace hopes rising . . . New bomb horrors and wariness on Asian fighting are setting Administration against global policing . . . But Army plans no cutbacks in defense spending—By G. H. Baker.

◆ BUILDUP of U. S. military arms and bases will continue despite the slight—but clearly discernible — drift away from the dangers of a hot war this year. The Pentagon is planning no cutbacks in its scheduled orders for vehicles, planes, ships, or strategic construction programs. As long as the U. S. is forced to exist in an uncomfortable world, military spending will necessarily remain at high levels.

This sober outlook is being impressed on the Administration's top military leaders by President Eisenhower in personal talks and in Cabinet meetings. The President, it is authoritatively reported, believes strongly that there is no alternative to peace—particularly after his briefings on recent progress made on nuclear weapons.

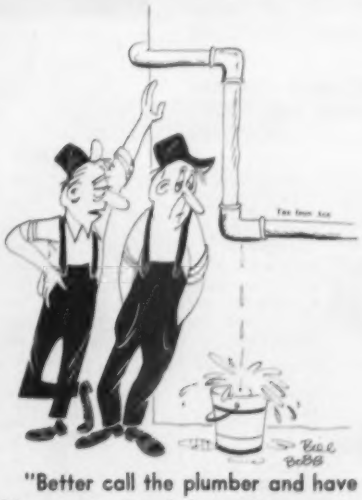
Peace Hopes Rise . . . Hopes for world peace have risen, as Ike sees it, because the Reds now realize also that an atomic war would leave this planet with little to pick up and start over again with. Destruction would be not only swift, but complete.

By personal examples of less war talk and less "saber rattling," Mr. Eisenhower intends to show the way to peace through a firm policy of "patience and fortitude." And public opinion polls show this policy is paying dividends in public support.

Army Urges Caution . . . Some State Dept. planners would like to see the United States rush in all directions to "preserve" the free world, but military men now caution against pouring ground troops into tricky Asiatic terrain. To move into such trouble-spots as Indo-China or the Malay straits is folly, strategists point out, as victory in such areas is all but impossible to the invader. Geography and local political feeling are strictly against the outsider.

Eisenhower Administration isn't prepared as yet to announce any policy declaration on this subject, but it is gradually moving away from the political notion that the U. S. has an obligation to police the world.

This gradual shift is being dictated in part by the White House. Many an American parent, it now appears, had the hazy idea that the "policing the globe" policy of former Administrations meant that somebody else — surely not their own sons — would do the policing. They now are protesting —bitterly, in some cases — the proposition that U. S. troops are earmarked for action in every international ruckus occurring outside the Iron Curtain.



"Better call the plumber and have him empty it—she's getting pretty full."

May Call Excess . . . "Stockpiles" of executives are in the making. It's part of Washington's long-range planning for a war or full-scale crisis. Under the "executive personnel" scheme now being readied for an emergency, the government is going to recruit and hold "on call"—just as it does military reserve officers—administrators and specialists who are trained and willing to move promptly into government service when trouble starts.

There's a strong belief among many civil defense planners that

Titanium Reports On Sale

Industry and private research groups are offered a 42-report package of government-assembled information on titanium and its alloys. Cost of the package is $40.

Some of the reports deal with tool life of high-speed-steel tools in turning and shaping operations. Others concern drilling, tapping, surface finishing, bandsawing, brazing, and soldering.

Commerce Dept. field offices and the Office of Technical Services at departmental headquarters in Washington sell the package. A list of the titles included can be obtained from the same sources.

...ON JET RINGS

By switching to flash butt-welding of extruded sections, we helped one customer cut fabricating costs of a jet engine ring from $67.85 to $41.93. A saving of $25.92 per ring — roughly 40%.

This is one of many cases in our files where rolling and flash butt-welding of bars, sections, extrusions or plate has proven to be the most economical and practical method of fabricating circular components. Shown below are some other "American Welded" components.

If you require a similar part, it is very likely that this type of fabricating can cut your costs. Why not write our Product Development Division today? They will be glad to study your problem.

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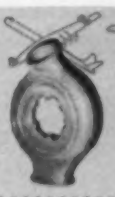
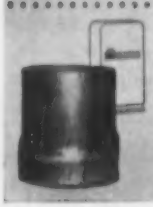
MACHINED RINGS
Rolled and flash-welded rings, machined to exact specifications and delivered ready for assembly.

WHEEL AND RIM ASSEMBLIES
Weldment of carbon steel bar and plate for use on heavy earth-moving equipment.

TURBINE FRAME ASSEMBLIES
Formed sheet metal bands and flash butt-welded rings fabricated into a jet engine component.



NOZZLE BOXES
Complicated welded assemblies of machined rings and sheet metal.



COMPRESSOR CASES
Welded bond for hermetically sealed refrigerator compressor.

SPECIAL MILL ROLLED SECTIONS
Amweld can show you how to save critical material and valuable machinery time by use of these sections.

MOTOR FRAMES
Steel bars and plate formed and welded into industrial motor frames.

Send for free catalog of American Welding Production Facilities.

the Eisenhower Administration should now (1) identify the nation's top-flight industrial executives, and (2) train them by putting them to work side by side with career federal workers.

Actually, the program started 2 years ago. A number of companies have been sending their best people to Washington to serve 6-month "hitches" under a policy of rotating key personnel in government positions. New plan will extend this policy by taking in more executives and subjecting them to longer training periods.

Congress Argues Taxes . . . Senate and House tax-writers continue to wrangle over whether or not to approve a $20-per-person tax cut. They appeared to be in solid agreement that corporation income is to be taxed at the wartime rate of 52 pct for at least another year, and that existing excise rates are to remain undisturbed.

Under present law, corporation tax rate is slated to drop to 48 pct and a number of excises—principally on autos, automotive parts, liquor, and tobacco—are to decline several percentage points apiece. In the event that the Senate-House conferees are unable to agree before the deadline, the corporation tax will be extended later on a retroactive basis. Tax officials have not agreed, however, on what to do about excise rates during such an interim period. A number of key Congressmen believe that final agreement will be reached before the Apr. 1 deadline.

Armor in Atomic Test

Protective value of U. S. armored vehicles under atomic warfare conditions will be measured soon at the Atomic Energy Commission test site in Nevada.

In about Mid-April, an Army task force of 266 vehicles with a nucleus of 85 medium tanks and armored troop carriers will move into an atomic blast area immediately following a test explosion. Leading the way will be the tanks, stationed only 3500 yd from ground zero, and the carriers, located 400 yd farther away.

Each will have its normal complement of soldiers. The army says it will be the first time that combat vehicles have provided the sole protection against an atomic explosion.

Crews of other vehicles, including trucks, trailers, and tank recovery units, will take shelter in trenches at the time of the blast. They will then board their vehicles to follow the tanks and carriers into the immediate explosion zone.

Purpose of the exercise is to find how quickly armored units can press home an attack after atomic artillery shells explode among enemy forces.

Mergers:

Justice Dept. will fight Bethlehem-Youngstown merger

Justice Dept. would seek court action to prevent stockholders of Bethlehem Steel Corp. and Youngstown Sheet & Tube Co. from voting on a proposed merger, and suggests the possibility of a Congressional investigation of an alleged stock tie in between the two companies and an ore producing firm.

Asst. Atty. General Stanley Barnes, head of the Antitrust Div., reveals in letters to Sen. Paul H. Douglas, D., Ill., the specific steps the Dept. would take should the two firms proceed with a proposed merger. Previously, Mr. Barnes had said the merger would "substantially lessen competition."

". . . If we are advised that the companies intend to proceed with the merger, we intend to ask the court to restrain both parties to the suit from taking any steps to consummate the merger, which would include votes of stockholders to approve the merger. In other words, we would seek to prevent any stockholder from voting on the merger," the Antitrust chief wrote Sen. Douglas.

THE IRON AGE

Mr. Barnes revealed to THE IRON AGE that he has continued to "discuss" the proposed merger with representatives (presumably lawyers) of the two firms, but indicates that his department feels merger plans proposed so far would violate the antitrust laws.

Justice Probe Continues

Justice officials, the Antitrust chief says, have looked into a report from Sen. Douglas that Bethlehem owns 183,000 shares of stock in Cleveland Cliffs Iron Co., and that Cleveland Cliffs owned 176,500 shares of stock in Youngstown. Thus, the senator wrote, it is possible that Bethlehem may already be in a position to exert some control over Youngstown.

Mr. Barnes replied that in view of the restrictions on the Justice Dept.'s ability to pass along information gained in grand jury investigations, "You might feel that it would be more appropriate for you to use the subpoena power of your congressional committees, rather than to rely upon our procedures."

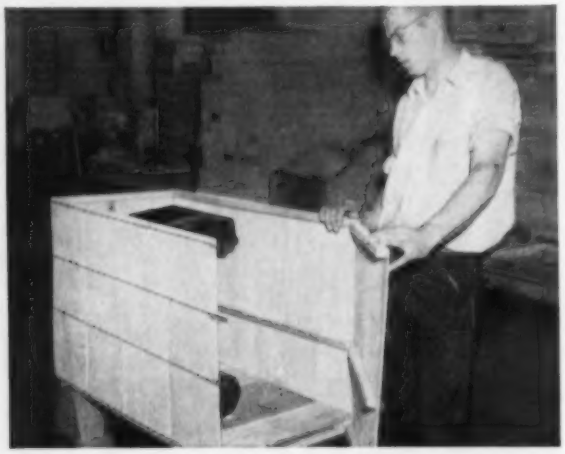
Mr. Barnes says there have been no grand jury investigations of the alleged stock tie in, and pointed out that if there had been, "I wouldn't suggest he (Sen. Douglas) could obtain the information easier by subpoena."

At the same time of the exchange of letters between Sen. Douglas and Mr. Barnes, the Antitrust Div. was unable to determine if such a tie-in existed. But last week, Mr. Barnes told THE IRON AGE that "we have some information . . . these studies don't stand still," indicating more probing.

Porcelain Insulators container saves 25% of over-all packaging costs. High finish, hard-to-pack items like these become easier to pack with positive product protection in General Box engineered containers.

Pressure Sterilizer container saves 17% of cost of packaging materials, 60% of packaging time, 9% of shipping weight. Customer uses eleven other General Box engineered containers.

Instrument Cabinet container weighs 230 pounds less than former, costs 42% less, is packed in one fourth the time—General container engineering saves this customer $8,000 a year.



Control Valve container eliminates complicated blocking that required 71 nails; cuts packing time 60%, shipping weight 10%, cuts container costs $1,500 to $2,000 in year.

Four examples of engineered savings from General Box Laboratories

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Chances are it will pay you well to find out how much better your containers can be. It's easy to do. Best and fastest way is to have a General Box man call. There's no obligation. Consult your local directory, or write direct. Ask for free copy of illustrated booklet, "The General Box."

Factories: Cincinnati; Denville, N. J.; East St. Louis; Detroit; Kansas City; Louisville; Milwaukee; Sheboygan; Winchendon, Mass.; General Box Company of Mississippi, Meridian, Miss.; Continental Box Company, Inc., Houston.

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Rural Steel Market Booms In West

Population growth sparks rural steel needs . . . Irrigation, modern methods increase steel needs on the farm . . . Firms look to West for new plant sites . . . Automation ASTE discussion topic—By *R. R. Kay.*

◆ A 20 PCT RISE in rural steel needs in the next five years is likely in California's central and lower San Joaquin Valley. There will be sharply increased demand for crop storage bins, new dairy barns and related buildings, fencing and barbed wire for new grazing pastures, and bulk feeding bins for poultry and livestock.

The area has large potential future growth, according to Robert H. Maddan, Jr., district vice-president in charge of sales for Columbia-Geneva Div. of U. S. Steel. He points to farming expansion in newly irrigated areas, modernization of existing farms, land and building developments, and a population that has increased 66 pct since pre-World War II.

How to get next to this business? Columbia-Geneva started a study of steel requirements on ranches and farms to pinpoint new steel needs. And their salesmen are calling on dealers in the area, pushing such services as printed guides on proper use of steel products: nail charts, instructions and calculators on farm roofing and siding, data on how to build and erect a fence, and how to buy and use nails.

Meeting . . . Metalworkers and engineers in the West are looking forward to the American Society for Metals Ninth Western Metal Exposition and Congress. The March 28 to April 1 event at Pan-Pacific Auditorium in Los Angeles is shaping up to be the biggest ASM show west of the Rockies. It will stress developments in machinery, processes, systems, and methods. More than 350 exhibitors will show their latest. Twenty-three technical societies are cooperating with ASM.

Automation . . . When do you? When don't you? Will it pay off? What does it mean to management? How do you approach it?

Metalworking executives and engineers gave it a lot of thought at the 23rd Annual Meeting of the American Society of Tool Engineers in Los Angeles.

Automation is a comparatively new manufacturing method; one that can't be taken for granted. A heads-up executive must look into every angle of this concept. Before rushing in, he has to make quite sure he'll end up with a really more economical operation. This caution came from W. Fay Aller, Sheffield Corp., Dayton.

"All right, Jackson. Let's cut out the funny stuff."

If it appears that his product can be more profitably manufactured with automation, Mr. Aller suggests, he then compiles figures showing how much can be saved in floor space, personnel, improved quality, scrap reduction, and capital investment. Each problem must be considered on its own merits, justified economically. Once justified, management must determine what method to use.

Achieving automation can add new headaches, Mr. Aller warned. "Some new problems will arise between labor and management. Reduction in lower-skilled personnel will be accompanied by increase in higher-skilled. This points to programs of educational work and employee upgrading."

ASTE brought its Industrial Exposition to the West for the first time. Over 270 manufacturers—about 30 pct of them from the West—displayed $3 million worth of equipment.

You've got to go West . . . Presidents of two large eastern firms revealed in San Francisco that their companies are eager to expand here.

Roy C. Ingersoll, president of Borg-Warner Corp., Chicago, said his company will acquire or build more plants on the West Coast. "It's vital for a company our size to have plants here to better serve the tremendous growing population of this area. . . . "

W. A. Roberts, president of Allis-Chalmers Mfg. Co., Milwaukee, said his firm, too, is interested in West Coast expansion. The company has nothing definite planned yet, but feels it will have to set up assembly plants soon.

New S.E.C.O. is Tops For These Operations

CUTTING WITH NEW S.E.C.O. Tools stay cool—require less frequent grinding. Finishes are uniformly good.

GRINDING WITH NEW S.E.C.O. Surface finishes are good. Loading and glazing of wheel are reduced—wheel life is prolonged.

WASHING WITH NEW S.E.C.O. Thorough removal of grease and dirt provides clean surfaces for smooth, long-lasting finishes.

ROLLING WITH NEW S.E.C.O. Rolls stay clean. You get maximum reductions and low power consumption.

New Sunoco Emulsifying Cutting Oil increases production, cuts operating costs. Its high machining efficiency permits uniformly good finishes, prolongs tool life. Its high detergency and purity keep tools, parts and machines clean. Its excellent mixing qualities permit its use in cold, hard or hot water. Test New S.E.C.O. in your own plant. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. IA-3.

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Refiners of famous High-Test Blue Sunoco Gasoline

MACHINE TOOL HIGH SPOTS

Put Atoms To Work Testing Tools

Company spokesman tells how radioactive tips permit rapid test operations . . . Particles worn from tools retain nuclear properties, can be used to check wear rate . . . Savings cited—By *E. J. Egan, Jr.*

◆ MACHINE tools aren't likely to come equipped with built-in nuclear power units for awhile, but atomic energy is already contributing to better metal cutting materials and methods.

Cincinnati Milling Machine Co., making extensive use of radioactive cutting tools in a variety of research programs, annually saves time and materials worth many thousands of dollars. Presumably, these savings will be greatly multiplied as research findings are incorporated in new or improved machine tools and machining methods.

Technique of using irradiated cutting tools for tool life tests is simple in theory. Actual practice is somewhat more difficult because of ever-present radio activity which must be adequately safeguarded and controlled. But Cincinnati Milling has developed its methods and equipment to the point life tests on "hot" tools are now daily routine.

Hear Test Talk . . . Test background and procedure was explained by Hans Ernst, the company's research director, to an atomic energy panel at Machinery & Allied Products Institute's recent Washington conference.

According to Dr. Ernst, as tool life goes, so goes the cost of any machining operation. Big question is how to minimize tool wear for lower machining costs. There are many possible answers but the right ones can only be found by testing cutting tools to determine their average wear rates.

True testing involves many combinations of conditions that apply in actual shop service. Cutting tool material, nature of the workpiece, spindle speed, feed rate, type of cutting fluid — these and many other factors affect tool life.

Tools marked for test by the company are first rendered radioactive by neutron irradiation in the giant reactors at Oak Ridge or Brookhaven. Returned to Cincinnati, they are put to work cutting metal in controlled tests.

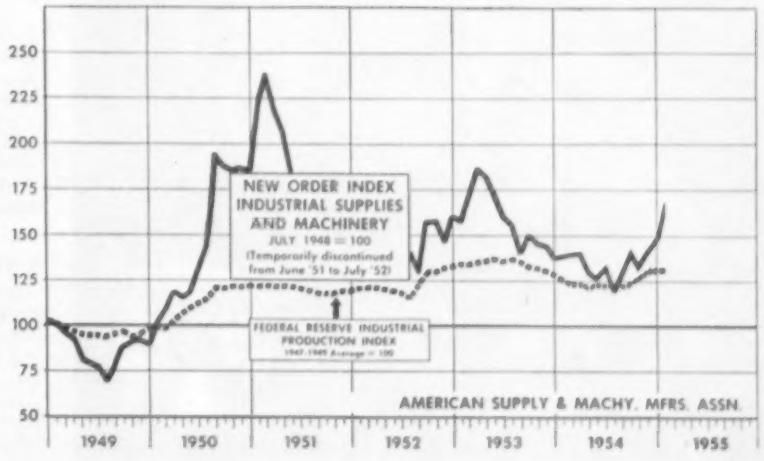
Chips Tell Story . . . As chips come off the metal workpiece they slide over the cutting tool and abrade it. The minute abraded particles of tool material are radioactive, of course, and over 95 pct of them remain attached to the workpiece chips. All chips are carefully collected and the measure of their radioactivity indicates the rate of tool wear.

Because each test requires only a few seconds of actual cutting time, one small tool tip will serve for over 400 tests. And each test provides the same useful information that formerly could be obtained only by full tool wear.

With the radioactive technique, the company can complete a test program in about 2 weeks or less. Old style test methods for a similar program would have required a full year, with enormous consumption of tool material.

Use Regular Tips . . . Tool tips shipped away to be irradiated are made of commonly used materials: high speed steel, cast alloys or cemented carbides. When cutting edges reach the allowed limit of dullness, tips are sent to Oak Ridge for safe disposal.

Company researchers visualize many applications for radio-isotopes in metal cutting and machine tool research. They are already studying effects of various geometric and kinematic factors on metal cutting. And they foresee uses for radioactive materials in friction and lubrication studies.



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Sandvik specialty steels are carefully produced in relatively small quantities which facilitate closer control and uniform results.

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In the subsequent rolling and annealing operations, Sandvik applies its specialized experience, skill and equipment,— "tailoring" the steel to the precise gauge, hardness and surface finish required.

The final result is the inherent quality which has made Sandvik spring steel successful in so many exacting applications.

You can get Sandvik strip steels:

- **In special analyses for specific applications.**
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- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered.**
- **Polished bright, yellow or blue.**
- **With square, round or dressed edges.**
- **Wide range of sizes in stock — also slitting facilities available.**

Ask your nearest Sandvik office for further information or technical assistance.

Sandvik Swedish Specialty Strip Steels are used for Textile Machine Parts such as sinkers, needles, etc. • Band Saws (metal, wood and butcher) • Camera Shutters • Clock and Watch Springs • Compressor Valves • Doctor Blades • Feeler Gauges • Knives such as cigarette knives, surgical, etc. • Razor Blades • Shock Absorbers • A Wide Variety of Springs • Trowels • Reeds: Vibrator, Textile, etc. • Piston Ring Segment and Expanders • and many other applications.

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The Iron Age

SALUTES

Robert C. McDowell Starting from scratch in 1944, this daring young man has made a whopping success of engineered construction by tackling the toughest jobs and thinking up new ways to handle them.

They say the day is past when a young fellow could go out and build himself an industrial empire. Maybe so but it was 1944 when young Robert C. McDowell started McDowell Co., Inc., and just 9 years later the Cleveland firm was taking in $15 million annually.

Operating in the field of engineered construction for heavy industry, Bob is still coming on with a rush.

His firm's recent acquisitions include machinery fabricating facilities and a sintering machine plant. McDowell crews roam over South America, Africa and this country, building heavy loading and production facilities.

A native of Kentucky, Bob came out of Kentucky University in 1935 with a degree in civil engineering. He knocked around construction work for some 10 years, handling increasingly important responsibilities.

In 1944 he rented a small shack in Cleveland, installed the attractive Mrs. McDowell as an office force and went to work with $10,000 capital and a crew of 40 men.

The bright, bold approach of the Cleveland team soon began to pay off. Bob jumped at bonus-penalty contracts—often called deathtraps—and thrived on them.

Once he had to remove paving from a 2 mile bridge at Greenville, Miss. Instead of chipping the concrete away, Bob bored perforations, ripped out 20 ft sections with a crane and beat the bonus deadline by 84 days.

Operating in this manner, McDowell men make a policy of beating deadlines. If a vital part is missing, the home shop makes the piece and a company plane makes overnight delivery to the job.

Despite aggressiveness and drive, Bob McDowell is still a retiring man who gives full credit to his work staff. Mrs. McDowell remains an important part of the company as secretary-treasurer, sharing the boss's office.

6:00 P.M.—HOME. This is John's house, of which he is justly proud. Note that a sturdy chain link fence protects his privacy and property. On his windows you'll find insect wire screening. Springs on his doors. TV Guy Wire on the roof. Flower bed borders in his garden.

8:00 P.M.—WORKSHOP. John is a "do-it-yourself" man. This is his workshop. He probably doesn't realize it but the screw driver he's using is made from wire. The wire brush on his buffing wheel and the handle on the paint roller, too. And, of course, indispensable nails and screws.

round the clock with
CF&I-WICKWIRE WIRE

9:30 P.M.—LIVING ROOM. Here, we see John relaxing in the comfort of his living room, where wire is used in many forms. Upholstery springs in his furniture. Wire in his TV set. Lampshade wire and picture cord wire. Even the screen in front of his fireplace is made of wire.

In our previous advertisements we have highlighted the importance of CF&I-Wickwire Wire in the daily life of John Q. Citizen. Here, at the end of a busy day, we find him returning home.

For the Wire You Require—
Check CF&I-Wickwire

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
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2737

The Iron Age INTRODUCES

W. Moody Childress, promoted to director, organization administration, industrial relations department, **U. S. Coal & Iron Div.,** U. S. Steel Corp., Birmingham.

Harold C. Seifert, appointed manager, bolt and nut division, **Republic Steel Corp. Charles A. Paler** moves to Cleveland as assistant manager of the division. **J. C. Noble** becomes head of the Gadsden bolt and nut plant.

H. H. Reed, appointed national accounts manager, **Air Reduction Sales Co.,** New York. **O. M. Donohue,** named district manager.

Robert V. Finch, heads new market development department, **Cowles Chemical Co.,** Cleveland.

Arthur F. White, appointed district manager, Detroit, **Axelson Mfg. Co.**

Norman D. Jesse, named vice-president, charge of sales, service and branches, Pump Div., **Byron Jackson Co.,** Los Angeles. **Garth F. Nicolson** becomes vice-president, charge of tool division; **Evan H. Sweet,** appointed vice-president and counsel; **Ross Barrett,** appointed vice-president, charge of public relations, advertising and market research.

W. W. Morris, appointed director, market research, **Westinghouse Electric Corp.,** Pittsburgh. **Robert R. Fair,** appointed budget manager, transformer division; **Thurman L. Rundlett,** appointed assistant planning director, new products.

A. M. Davis, joined the Power-Plants Div., **Marquardt Aircraft Co.,** Van Nuys, Calif.

Donald D. Gulling, appointed equipment sales manager, Industrial Div., **Lempco Products, Inc.,** Bedford, Ohio.

James A. Mogle, Jr., appointed vice-president, purchasing and reciprocal relations, **National-Standard Co.,** Niles, Mich. **Thomas H. Pearce,** named vice-president, engineering and operations; **William D. Pearce** becomes assistant vice-president, bead wire and hose wire sales.

Francis D. Holden, appointed manager of sales, **Macwhyte Co.,** Kenosha, Wis.

James D. Ford, named assistant vice-president, **Weirton Steel Co.,** Weirton, W. Va., division of National Steel Corp. **Millard F. Harter,** promoted to credit manager.

Theodore C. Ohart, named manager, marketing, Silicone Products Dept., **General Electric Co.,** Waterford, N. Y.

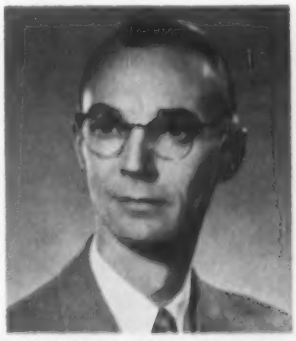
R. P. Ganchan, named vice-president and general manager, **Automotive Rubber Co., Inc.,** Detroit. **R. H. Glezen,** named vice-president and general sales manager.

Floyd V. Snodgrass, elected vice-president, charge of production, **Walworth Co.,** New York.

Harold Ashton, appointed manager, sales and service, **National Broach & Machine Co.,** Detroit.

R. K. CLIFFORD, named chairman of the board, Continental Steel Corp., Kokomo, Ind.

EDMOND P. SEVERNS, named president, Continental Steel Corp., Kokomo, Ind.



HOWARD C. WILLIAMS, named vice-president in charge of sales, Continental Steel Corp., Kokomo.

KENNETH A. DeLONGE, manager, iron and non-ferrous castings, development and research, International Nickel Co., Inc.

George W. Kross, Jr., promoted to superintendent, Tubular Products Div., **Babcock & Wilcox Co.**, Alliance, Ohio. **Carl J. Stoops**, named assistant superintendent.

Milan P. Getting, Jr., appointed assistant to general manager, **Allis-Chalmers Mfg. Co.**, Pittsburgh works. **George Shombert, Jr.**, named assistant works manager; **Sebastian W. Phillippi** becomes assistant superintendent, electrical test dept.

Paul D. Metzger, appointed associate chemical engineer, lubrication and fuels, at **Wheeling Steel Corp.'s** research laboratory, Benwood, W. Va.

J. E. Kunkler, named sales manager, southwestern division, **Armco Drainage & Metal Products, Inc. J. B. Evans** becomes manager, southern California and Arizona sales for the Calco Div.

W. J. Lohmeyer, Jr., promoted to district manager, Pittsburgh, for **Latrobe Steel Co.**

Albert W. Gudal, appointed assistant purchasing agent, **Lukens Steel Co.**, Coatesville, Pa. Mr. Gudal also becomes a member of the company's management council.

George C. Rose, elected president of **Latrobe Die-Casting Co.**, Latrobe, Pa. **S. F. McElroy**, elected chairman of the board of directors.

Lewis A. Hovey, appointed division superintendent and **William E. Brandt** as assistant division superintendent, openhearth and foundry division, **U. S. Steel Co.'s** Homestead District Works.

Daniel H. Dellinger, named assistant vice-president, charge of research, development and quality control, **Great Lakes Steel Corp.**, Detroit.

W. F. MUNNIKHUYSEN, elected chairman of the board, Koppers Co., Inc., Pittsburgh.

FRED C. FOY, named president and chief executive officer, Koppers Co., Inc., Pittsburgh.

FRANK J. O'LAUGHLIN, elected president, Commander Mfg. Co., Chicago.

JAMES F. McCARTNEY, elected vice-president and general sales manager, Duff-Norton Co., Pittsburgh.

ROD BALANCE
Correctly Obtained by EXACT WEIGHT

This pair of SHADOGRAPH Scales is built into a precision milling machine for balancing connecting rods. Rod is placed on scale to determine amount each end is out of balance. Reading is automatically transmitted to the milling machine for correct stock removal. Rods then checkweighted on SHADOGRAPH Scales for final weight distribution. Only one of many applications where EXACT WEIGHT provides the metal working industry with methods of inspecting, controlling and checkweighing products to predetermined specifications by weight. Send us your problem — our Engineering service is at your command.

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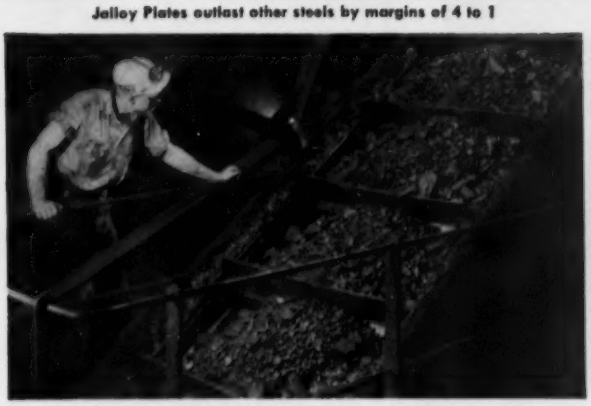
JALLOY HEAT-TREATED STEEL PLATE BEATS WEAR DUE TO IMPACT AND ABRASION

Jalloy Plates outlast other steels by margins of 4 to 1

Jalloy Aprons in Tyrock screen last 3 times as long as other steels



Jalloy lowers maintenance costs on ore and coal conveyors

Jalloy provides longer wear with less repair in truck bodies

Jalloy Heat-Treated Plate is the special purpose steel that is heat treated to provide longer wear on applications where impact and abrasive conditions are severe.

In comparison with other abrasion-resistant steels as well as mild steels, it gives optimum results when heat treated, to a Brinell hardness of 340 and up. Jalloy permits savings in steel costs, maintenance, and repair. Furthermore, it is easily welded. Jalloy is available in three grades—1, 2, and 3 to meet various service requirements.

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Complete data concerning CHEMICAL COMPOSITION . . . HEAT TREATMENT . . . WELDABILITY . . . PHYSICAL PROPERTIES . . . will be mailed to you promptly. Write today.

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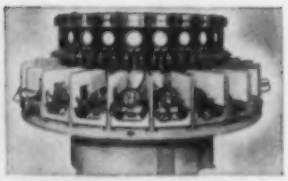
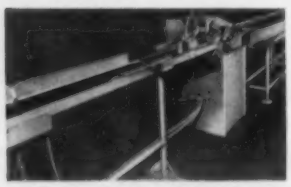
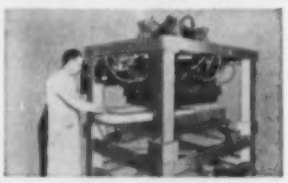
TALL DRINK'S BEST FRIEND



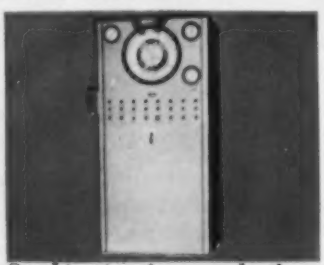
24 station compressor test stand makes 4 tests per unit at 350 units per hour



Soldering machine for refrigerator heat exchange assemblies



Special fixture for piercing and forming refrigerator doors



Combination freon and oil charging machine

Those tinkling ice cubes most of us take for granted have kept many an Acme engineer awake at nights . . . over their drafting boards, of course.

Actually, making the simple ice cube is not so simple in today's competitive economy. Many hundreds of hours have been spent by Acme designing and building engineered products for this field in order to give manufacturers definite production or product advantages.

Some of the results are indicated at the right.

Refrigeration is but one field where Acme has won the confidence and respect of American industry and our armed services. Aircraft over-run barriers . . . tools, dies, jigs, and fixtures . . . in fact, anything specially engineered of a mechanical, hydraulic, or electrical nature is of interest to our staff of specialists.

Send your problem or blueprints . . . get Acme's preliminary recommendations or quotations.

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Acme ENGINEERED PRODUCTS

Test Equipment . . . Process Equipment . . . Special Machinery . . . Tools, Dies, Jigs, and Fixtures . . . Patterns

PERSONNEL

Marcus J. Tremble, named traffic manager, **Inland Steel Products Co. Morris M. Rose,** named traffic manager, Milwaukee plant; **James F. Van Dien,** appointed sales representative, North and South Dakota and northern Nebraska.

W. D. Willes, named product manager, Nordstrom valves, **Rockwell Mfg. Co.,** Pittsburgh.

William H. Filter, appointed sales manager, southern and western sales territories, **Monarch Rubber Co.**

J. R. Parsons, appointed assistant to the vice-president, charge of production, Electrical Materials Div. plants, **Hubbard & Co.,** Pittsburgh.

R. W. Hutchinson, named product sales manager, Pacific Switchgear Div., **Federal Pacific Co.,** San Francisco.

O. Müller-Habig, elected president, **Centrico Inc.,** Englewood, N. J.

Magnus A. Grunlan, appointed plant manager, **Dollin Corp.,** Irvington, N. J.

Arthur W. Cain, promoted to vice-president, charge of sales, **Volco Brass & Copper Co.,** Kenilworth, N. J. **Arthur C. Culbertson,** named treasurer.

OBITUARIES

Adrian C. Hughes, 51, director of research, **Dixie Firebrick Co.,** Birmingham.

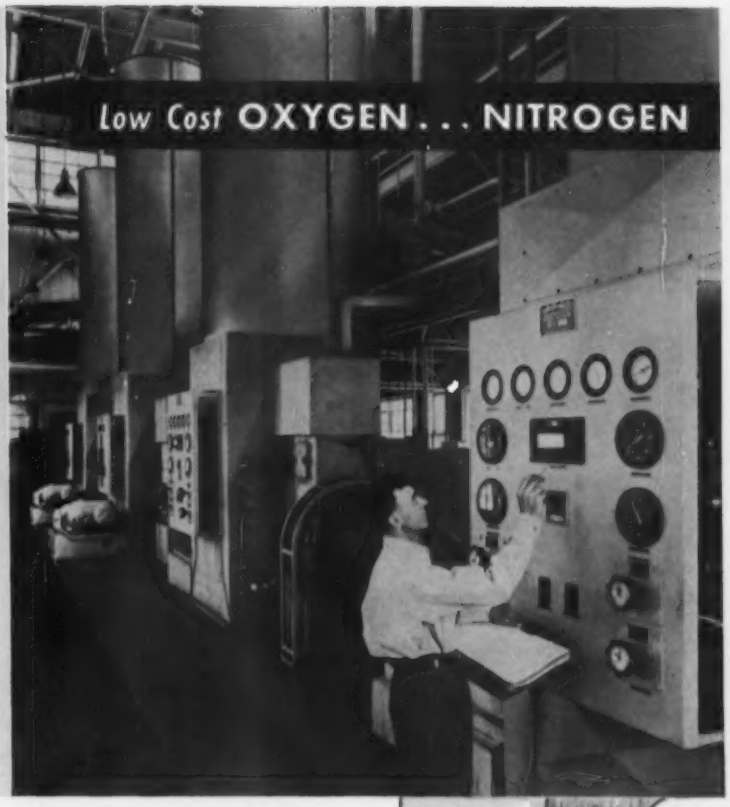
Boyd H. Carr, Sr., 67, former head of pricing and chief statistician, **The Dow Chemical Co.,** recently at Tucson, Arizona.

Harold W. Browall, 54, sales metallurgist, **Inland Steel Co.,** suddenly while in Detroit.

Raymond Deutsch, founder and president of **Monarch Aluminum Mfg. Co.,** recently in Boca Raton, Fla.

REDUCE STEEL-MAKING COSTS

with abundant oxygen produced "on location"



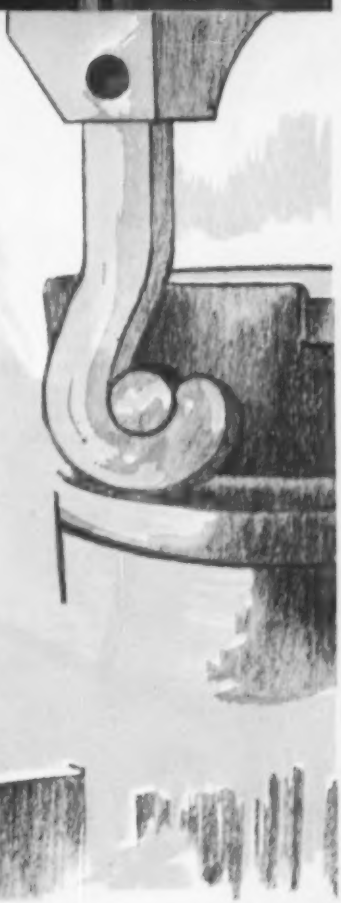
Oxygen is in such demand for steel-making that in-plant production has become an economic necessity.

The most practical solution to the problem of providing abundant, low-cost quantities of oxygen is an Air Products Multiple Generator Lease installation. It saves many thousands of dollars per year on current oxygen requirements of steel companies. In addition it supplies ample surplus oxygen for experimental purposes such as top blast conversion, flame enrichment, desiliconizing, decarburizing, hot top heating and other research aimed at technological improvement.

Making your own oxygen minimizes any possibility of interruption of supply . . . eliminates transportation and handling costs . . . adjusts supply to demand continuously.

An Air Products Multiple Generator installation can be adapted to produce high purity by-product nitrogen in addition to oxygen. If you need nitrogen now or contemplate needing it, let us show you the possibilities for your Company. You incur no obligation for preliminary consultation.

More than 100 Air Products engineers are at your service.



Air Products
INCORPORATED

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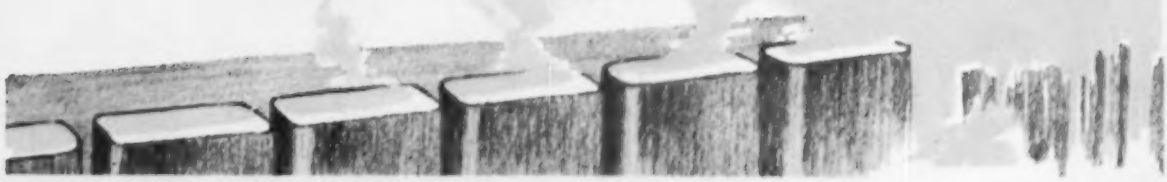
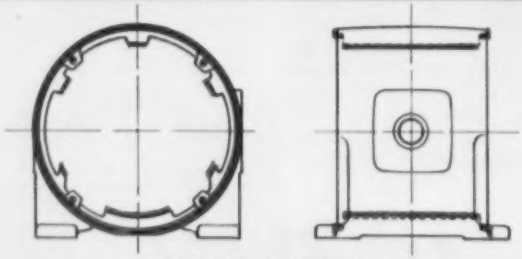


PROBLEM

1. lower stator frame machining costs.
2. increase production and accuracy
3. run any one of four different size parts



MACHINING NECESSARY

Drill 8 holes	Bore two inside diameters
Chamfer 8 holes	Rough face ends
Tap 8 holes	Remove chips

for problems in Drilling, Boring, Facing and Tapping

Call a Natco Field Engineer

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NEW NATCO HOLEWAY

cuts costs and increases production . . . and accuracy by combining operations!

SOLUTION

30 ESTIMATED GROSS PRODUCTION
PARTS PER HOUR
(ANY ONE OF FOUR DIFFERENT SIZE PARTS)

OPERATIONS

STATION No. 1
Load 1 part.
STATION No. 2
R. H. Horizontal Head
Combination rough bore for 10.492/10.490 half thru, rough bore for 12.064/-12.062 diameter, finish bore 10.520/10.510 diameter and rough face end.
L. H. Horizontal Head
Drill 4 holes
STATION No. 3
Idle
STATION No. 4
R. H. Horizontal Head
Drill 4 holes
L. H. Horizontal Head
Combination rough bore for 10.492/10.490 diameter rough bore for 12.064/12.-062 diameter and rough face end.
STATION No. 5
Idle
STATION No. 6
R. H. Horizontal Head
Tap 4 holes
L. H. Horizontal Head
Tap 4 holes
STATION No. 7
Idle
STATION No. 8
R. H. Horizontal Head
Idle
L. H. Horizontal Head
Finish bore to 10.492/10.490 diameter thru.
STATION No. 9
Blow chips out of center bore and 8 tapped holes (4 each side) and blow chips off top.
STATION No. 10
Unload 1 part. Part to be unloaded onto gravity conveyor.

NATIONAL AUTOMATIC TOOL COMPANY, INC.

RICHMOND, INDIANA

NATCO

DATA SHEET NO. 3

INLAND

facts about

LEDLOY*

*Patented Tradename of Inland Steel Company, leaders in development of Leaded Steels.

LEDLOY INCREASES PRODUCTION 50% ON PRECISION MICROMETER PART

Tools last longer . . . machines work more, idle less!

Machining a steel bar into this micrometer thimble calls for forming, drilling, reaming, knurling, threading, and cutting. Tolerances must be precisely controlled, otherwise rejects start piling up. For this exacting job, Ledloy proved better on every count.

When this well-known instrument manufacturer switched to Ledloy instead of the B-1113 screw stocks he had been using, the following advantages were quickly apparent:

- production increased 50%
- tolerance control was more uniform
- rejects dropped 5%
- finish was superior
- tool life increased, machine down-time sharply decreased

Ledloy cuts machining time

Increased production and improved operation like this are typical of performance reports on Ledloy. The fact that Ledloy can be machined at extremely high speeds (up to 45% faster than B-1113 in some cases) is only one of the reasons for its increased productivity. By cutting machine down-time, Ledloy gives far greater output per machine. The reason is that Inland's patented process of adding lead to steel lowers the steel's friction component, actually lubricates the cutting tool during machining. Less heat is generated and tool-edge build-up is minimized. Machines spend *more* time working, *less* time standing idle while tools are re-ground.

Yet Ledloy retains all the advantages of quality open hearth steel

You can expect from Ledloy the same performance in ductility, strength and heat treating properties that you get with good open hearth steel of comparable chemistry. This means that, using Ledloy, manufacturers of screw machine products and machined forgings can get more product per man-hour, superior machining and finishes without sacrificing all the desirable mechanical and metallurgical properties of open hearth steel.

If your product requires machining, it will pay you to get all the facts on Inland Ledloy. Ask your cold-drawer, forger or jobber about it today, or write Inland Steel Company for an interesting new booklet, "Properties of Inland Ledloy Steels."

world's most machinable steel!

LEDLOY

INLAND

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38 South Dearborn Street • Chicago 3, Illinois

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The Iron Age
FOUNDED 1855

Byproducts go to market—

New Process Washes Coke Oven Gas With Waste Pickle Liquor

◆ Impurities in coke oven gas can now be recovered by a new process which uses waste pickle liquor for the washing treatment . . . Moreover, the products normally considered waste are converted to marketable items.

◆ Ammonia, hydrogen sulphide and hydrogen cyanide are removed from coke oven gas, leaving it at city gas purity . . . After a six-stage treatment, pure ammonium sulphate crystals, ferrous hydroxide and iron cyanides are recovered . . . Elemental sulphur or sulphuric acid is recovered in another step.

By T. E. DIXON, Associate,
Mellon-Stuart Industrial Construction Co., Pittsburgh

◆ SIMULTANEOUS REMOVAL of ammonia, hydrogen sulphide and hydrogen cyanide from coke oven gas can now be done by washing them out with the waste pickle liquor from steel plants. Usually, this liquor is a solution of ferrous sulphate containing some free sulphuric acid. Pure ammonium sulphate crystals, ferrous hydroxide and iron cyanides are recovered in marketable form, and hydrogen sulphide is processed to elemental sulphur or sulphuric acid, either for sale or use in the process.

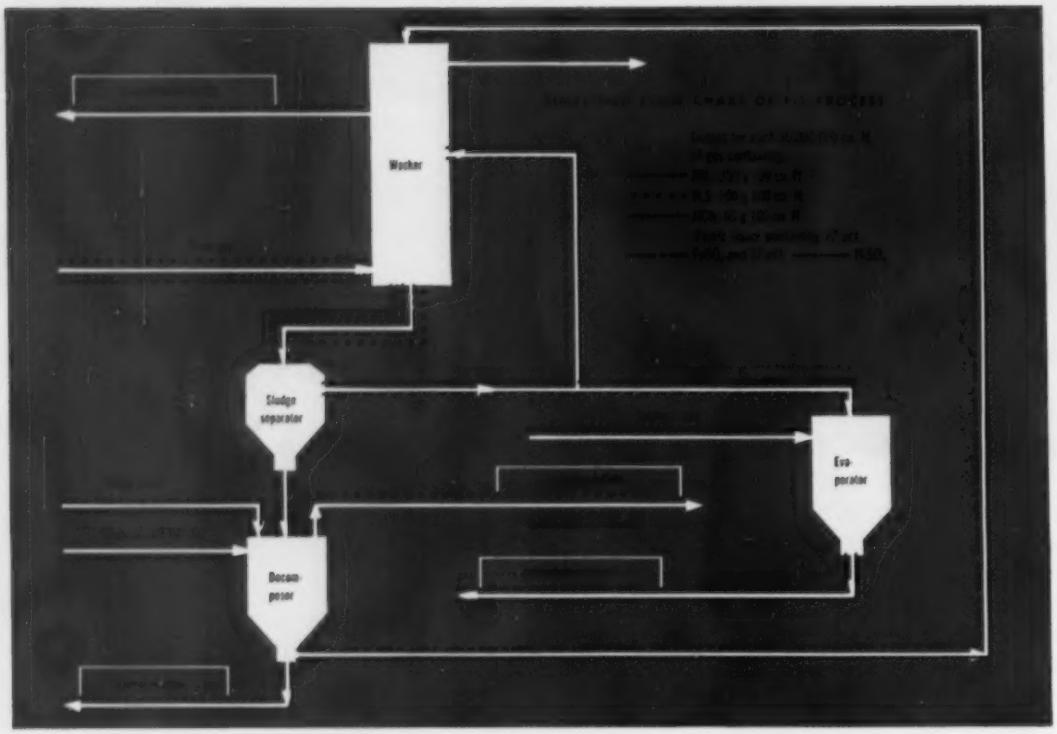
This treatment, known as the F-S Process, is a recent development of F. J. Collin, A.G., Dortmund, Germany. American rights to this development have been acquired by Mellon-Stuart Industrial Construction Co., Pittsburgh. The equipment required for the process is relatively simple, and through the recovery of the chemical components, cost of the installation can be repaid within a few years.

First, the free sulphuric acid in the pickle liquor reacts with the ferrous sulphide obtained during the cycle of operations, to form ferrous sulphate and nascent hydrogen sulphide. This ferrous sulphate and the ferrous sulphate already present in the added waste pickle liquor reacts with ammonia, giving soluble ammonia sulphate and insoluble ferrous hydroxide.

The ferrous hydroxide reacts with the hydrogen sulphide and hydrogen cyanide in the crude gas and forms insoluble ferrous sulphide and insoluble ammonium - ferro - ferro - cyanide. Should any soluble ammonium ferro cyanide be formed, it is immediately converted with the ferrous sulphate and left as insoluble ferro-ferrocyanide and soluble ammonium sulphate.

No thio-cyanides are formed. The hydrogen sulphide and hydrogen cyanide washed from the crude gas are taken off in the form of solids which, together with a solution of ammonium sulphate, form a pumpable sludge. The solids are separated or regenerated to ferrous sulphate by the free sulphuric acid in the waste pickle liquor.

Hydrogen sulphide is evolved and may be processed to sulphuric acid or elemental sulphur. The insoluble ferrous hydroxide and ammonium sulphate which are first formed in the cycle of reactions are unnecessary for the conversion.



The ferrous hydroxide is drawn off and introduced together with the cyanide sludge into the blast furnaces. The maximum quantity of this ferrous hydroxide is equivalent to the amount of ammonia which is not used for fixing the hydrogen sulphide and hydrogen cyanide in the crude gas.

In addition to ammonium sulphate and hydrogen sulphide, ferrous hydroxide and ferrocyano compounds are saleable products insofar as both can be introduced into the blast furnaces. Moreover, ferrous hydroxide may be used for dry gas purification purposes, production of very pure iron powder, or production of pigment paints, depending on the output of ferrous hydroxide from a large plant. The ferro-cyanide compounds may also be processed to pigments.

In processing, the weak acid solution of ferrous sulphate, which can be made more acid, is pumped into the top of the washer, passing counter-current to the gas tsream. The washer is of the multi-stage type. The solution first passes three bubble cup trays for binding traces of ammonia which may be left in the gas. No precipitation of solids takes place since the solution is acid.

The washing solution passes the several stages in sequence. In each stage, it is sprayed through specially designed nozzles capable of handling sludgy solutions. In all stages, the solution circulates and overflows into the stage below. This arrangement of solution flow allows for easy control of chemical reactions within each stage by means of pH-value controllers.

Fixing of ammonia normally takes place in the upper stages of the washer. The ammonia reacts with ferrous sulphate, forming ammonium sulphate and ferrous hydroxide. It may also be fixed by partial neutralization with sulphuric acid. The ferrous hydroxide so formed reacts with the hydrogen sulphide and hydrogen cyanide, thus producing ferrous sulphide and ammonium-ferrocyanide compounds. While the removal of ammonia takes place in the upper part of the washer, hydrogen sulphide and hydrogen cyanide are washed out in the lower part.

Ammonium sulphate has dual purpose

With a six-stage washer and suitable pH-value control, part of the solution can be drawn off from the second upper stage, either periodically or continuously. Surplus ferrous hydroxide in this part of the solution is separated and the remainder returned to the second washing stage. Some of the ammonium sulphate solution coming from the sump of the bottom washer stage is first separated from the solids and then fed simultaneously into the second washing stage.

The circulating portion of the ammonium sulphate solution serves two purposes. Firstly, it dilutes the sludge, the quantity of which increases in the lower stages of the washer. Secondly, it buffers the scrubbing solution, thus suitably influencing the washing process.

The sludge, consisting of a suspension of ferrous sulphide and ammonium-ferro-cyanide compounds, is drawn from the sump of the bottom

washer stage and pumped into an intermediate tank. It is then conveyed to a separation plant for removal of solids.

After passing another intermediate tank, part of the separated ammonium sulphate solution returns to the washer. The remainder, the quantity of which corresponds with the ammonia content of the gas, runs to a lye purifier. In here, the solution is treated with hydrogen sulphide coming from the decomposer, effecting separation of any traces of iron remaining.

Acid neutralizes ammonia

Any volatile ammonia still present in the solution is neutralized by means of sulphuric acid in the neutralizer (pH-value controller). The solution is then filtered to separate the remaining solids of ferrous sulphide which formed when treated with hydrogen sulphide.

The clarified ammonium sulphate solution is then pumped through a preheater into the upper part of a degasifier for stripping off the hydrogen sulphide. After leaving the degasifier, the solution runs into an intermediate tank from where it is conveyed through another filter to the evaporation plant. At this point, large, pure ammonium sulphate crystals are obtained. Due to the prescribed treatment, they are free of iron salt impurities.

The sludge separated from the crude ammonium sulphate solution is mixed in an agitator with the ferrous sulphide sludge which had been separated from the ammonium sulphate solution in the filter. The ferrous sulphide is converted into ferrous sulphate by the waste pickle liquor in the decomposer. Sulphuric acid is added, if necessary.

The cyanide sludge which had not decomposed is separated and can be sold. In this step, vapors of hydrogen sulphide are evolved and leave the decomposer for further processing into sulphuric acid. The remainder, now free of cyanide sludge, is a weak acid ferrous sulphate solution containing a little ammonium sulphate formed from ammonium-ferro-ferro-cyanide in the decomposer.

This remaining solution is brought into contact with a partial stream of purified coke oven gas in the lower part of the degasifier for desulphurization. The desulphurized solution is then returned to the washer while the coke oven gas, enriched with hydrogen sulphide, is led back into the crude gas suction main.

Prewash crude gas

The possibility of processing crude coke oven gas to city gas quality depends entirely on the quantitative proportion of the three components to be removed from the crude gas. Ammonia content must be high enough to form sufficient ferrous hydroxide which is necessary for fixing hydrogen sulphide and hydrogen cyanide. Only then can city gas purity be attained. Should this purity not be desired, complete removal of hydrogen sulphide would not be necessary.

The amount of hydrogen sulphide left in the gas does not influence the quality of the ammonium sulphate to be recovered. If hydrogen sulphide content is high, it is possible to prewash the crude gas before passing it through the FS-Process.

Traces of tar in the crude gas have not resulted in impurities in the ammonium sulphate during pilot plant operation. This is due to the large amount of ferrous hydroxide which easily and completely absorbs these impurities.

A higher ammonia content in the crude gas has another advantage. It would allow more waste pickle liquor to be processed to marketable ferrous hydroxide.

Production of ferrous hydroxide may also be increased by not neutralizing the volatile ammonia with sulphuric acid, but by stripping off and converting it in the washer. This not only makes better use of the waste pickle liquor, but saves the sulphuric acid for neutralization.

Sulphuric acid used in steel plants for pickling can be used later for converting ammonia into ammonium sulphate, thus serving a dual purpose. Moreover, the loss of iron caused by the pickling is balanced by the conversion of the ferrous sulphate to saleable ferrous hydroxide and ferro-cyano compounds.

The pilot plant installation has been equipped with more and higher washing stages to assure continuous processing of the waste pickle liquor for simultaneous gas purification and product recovery. The equipment includes devices for fine uniform spraying of washing solution.

Unit built for anti-corrosion

Provisions have also been made for minimizing corrosion. Washer walls have lye- and acid-proof linings, and nozzles are made of a special grade of steel. Thermoplastic materials, based on polyvinylchloride, polyethylene and polyisobutylene, are widely used.

Complete separation of solids from the circulating solution is not necessary. After the bulk of solids is removed, major portions of the solutions discharged from the separators are returned to the washer where they are again mixed with newly formed sludge.

Only the ammonium sulphate solution, which is processed into crystals, is filtered of all impurities so that it is clean before entering the evaporation plant. There are no difficulties in filtering the solutions since the ferrous sulphide and ferro-cyanide compounds are easily filtered out in the final stage.

The equipment includes no complicated or sensitive parts. According to Collin, the development is based on sound chemical and technical principles. It is claimed that the installation will pay for itself within a few years. This is based on the value of the recovered products which may be sold competitively on the open market or reused. It may be an answer to the steel industry's disposal problems.

On gears and splines—

Accurate Unground Hobs, Precision Sharpening Methods Cut Production Costs

◆ Savings up to 18 pct on initial hob costs are achieved at Rochester Gear Works through the use of accurate unground hobs . . . Multiple-thread hob designs speed hobbing machine output on all parts . . . Hob sharpening costs are reduced by a high-speed hob sharpener equipped with wet grinding equipment.

By GEORGE LYONS,
Plant Superintendent,
Rochester Gear Works,
Rochester, Minn.

◆ ACCURATE unground form multiple thread hobs used on modern high speed hob sharpening machines are helping cut production costs at Rochester Gear Works on a wide variety of high production precision gears and splined parts. Initial hob cost savings of up to 18 pct are being made by using hobs with accurate unground forms rather than those having ground tooth forms.

Teeth on both steel and cast iron gears are rotary-shaved following the hobbing operation with a stock removal of 0.003 to 0.005 in. measured over pins. All hobs are multiple thread designs in which the number of threads is not prime with the number of teeth in the

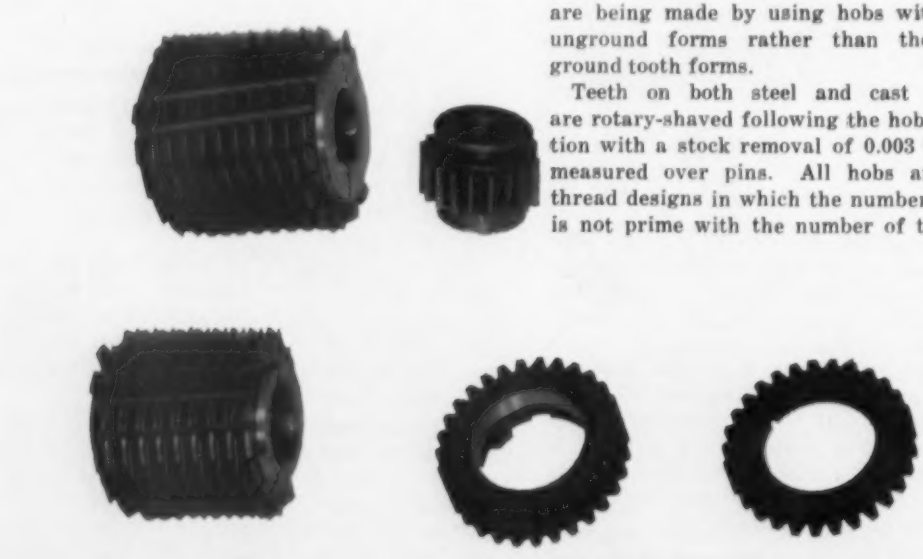
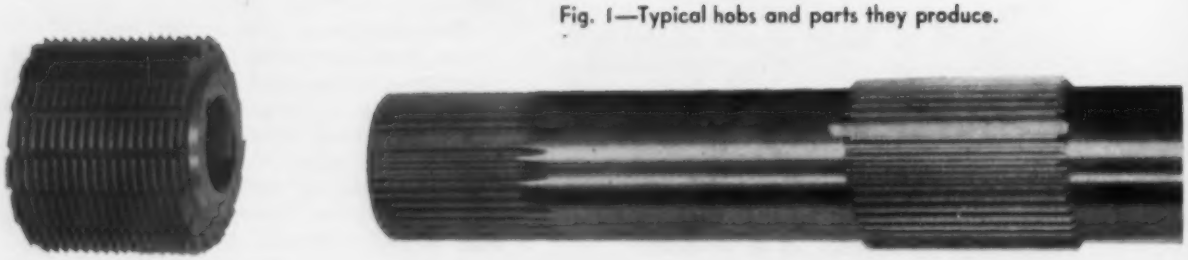


Fig. 1—Typical hobs and parts they produce.



individual gears or splines, thus avoiding all effects of minute thread spacing errors.

The hobs, made by Star Cutter Co., Farmington, Mich., are semitopping types that chamfer the top edges of the gear teeth, thereby eliminating deburring operations for sharp corners at these points. The use of multiple thread hob designs speeds hobbing machine output on all parts.

Hob sharpening costs are being reduced by a variable speed hydraulic-powered high-speed hob sharpener equipped with wet grinding equipment. This machine, a model redesigned and rebuilt by Star Cutter Co., sharpens hobs up to twice as fast as conventional gear-driven types. The wet grinding equipment permits a high rate of stock removal. A motorized, precision wheel spindle on the sharpener provides a smooth finish on the hob cutting surfaces from which about 0.020 in. of stock is removed at each sharpening.

Typical hobs and the toothed parts they produce are seen in Fig. 1. Shown here are: (top) a cast iron washing machine agitator drive shaft gear, (middle) automotive automatic transmission front and rear pump drive gears and (bottom) a tractor hydraulic lift spline shaft.

The 20-tooth, 10-pitch, 20-degree pressure angle cast iron washing machine gear teeth are held to a 0.002 in. pin-size tolerance and a 0.002 in. indicator reading concentricity tolerance. A three-thread hob is used.

The 29-tooth, 10-pitch, 24-degree pressure angle pump drive gears are SAE 1147 steel parts that are phosphate-coated following machining operations. Tooth-to-tooth spacing errors on these gears are held to 0.0005-in. tolerance and concentricity of the tooth profiles with the bores is held to 0.003-in. indicator reading. A double thread hob is used to generate the teeth on these pump drive gears.

The SAE 1040 steel spline shaft has 38-tooth, 20-pitch, 20-degree pressure splines on both ends and a 43-tooth spline in the middle. These splines are hobbed with triple-thread topping hobs. By specifying a full topping hob for this part, a grinding operation for the length of the splines on each end is avoided.

The washing machine gears are hobbed, Fig. 2, on eight spindle hobbing machines. These gears have a reamed hole and are press-fitted, two on an arbor, for the hobbing operation. Hobs are fed at 0.070-in. feed per revolution. Production rate for the hobbing operation is 198 pieces per hour, and the gears on each station are completed when they are about halfway around the machine. The hobs are shifted every eight hours and sharpened once a week.

The pump gears are also hobbed on eight spindle hobbing machines. These gears have broached holes and are press fitted on arbors for hobbing. The wider faced front pump gears are hobbed two at a time and the thin, rear pump gears are hobbed six at a time. About 334 thin gears are produced per hour on the hobbing operation. Hobs are shifted every 15 machine cycles and from five to six shifts are made before the hobs are resharpened. Hob feed is 0.050 in. per revolution.

The spline shafts are hobbed, Fig. 3, on centers on single spindle hobbing machines. A hob feed of 0.050-in. per revolution is used in hobbing the spline shafts to obtain the desired finish. About 100 spline shafts are produced every eight hours per machine on this operation. The spline on each end must be held in relationship to within a 5-minute tolerance. This is equivalent to a 0.0015-in. arc measurement. To produce the splines to such a close relationship, controlled start hobs are used.

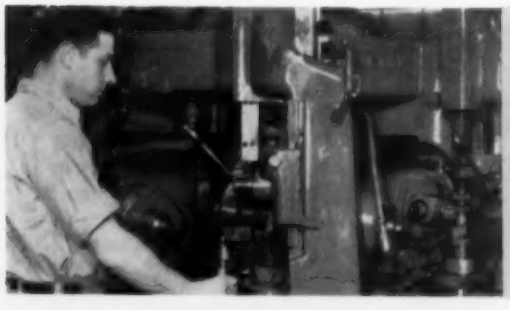


Fig. 2—Washing machine gears, left, are hobbed on eight-spindle hobbing machines. Production rate for hobbing operation is 198 pieces per hr.

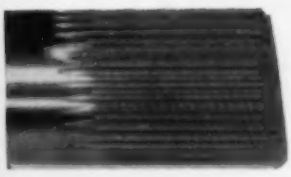


Fig. 3—Spline shafts, right, are hobbed on this single-spindle hobbing machine. About 100 spline shafts are produced every eight hours per machine.

Stability and uniformity—

How Titanium Alloys Behave at High Temperatures

◆ **Titanium's behavior at high temperatures has been of absorbing interest to designers and materials engineers . . . In the air and land vehicles of tomorrow, high useful strength at high temperature will be of paramount importance.**

◆ **Here, based on extensive research, is a more complete picture of how titanium alloys behave at high temperatures . . . Stability and uniformity of properties are generally good and titanium offers useful strength for long-term applications up to 1000°F.**

By **D. R. LUSTER**, Supervisor, Development Engineering, and
B. L. SHAKELY, Research Engineer, Rem-Cru Titanium, Inc., Midland, Pa.

◆ ELEVATED TEMPERATURE properties of titanium alloys are of considerable interest to design engineers. To obtain a comprehensive picture of how titanium alloys behave in the temperature range to 1000°F, Rem-Cru Titanium, Inc., Midland, Pa., has conducted extensive studies both in its own laboratory and in sponsored work at Battelle Memorial Institute.

Studies have centered around basic types of titanium alloys generally available in tonnage quantities. Strengths in typical high-strength alloys, annealed, range from 115,000 to 150,000 psi at room temperature. Stability and uniformity of properties are generally good. Notch sensitivity is good and fatigue performance of the commercial alloys is excellent. While the titanium alloys show creep at room temperatures, no creep is observed at moderately elevated temperatures. Useful strengths are available to 1200°F, and, in long term applications, to 1000°F.

Carbon, oxygen and nitrogen tend to

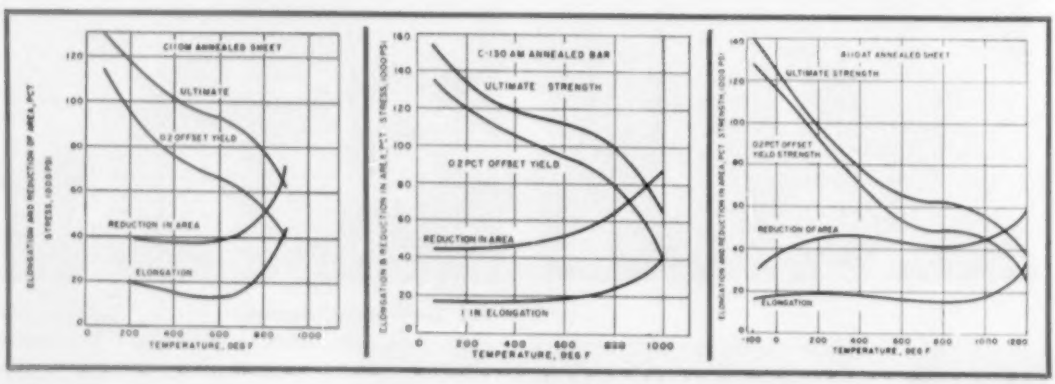


FIG. 1—Tensile properties vs. temperature for typical titanium alloys in the annealed condition. Shown at left is C-110M sheet; center, C-130AM bar; right, A-110AT annealed bar.

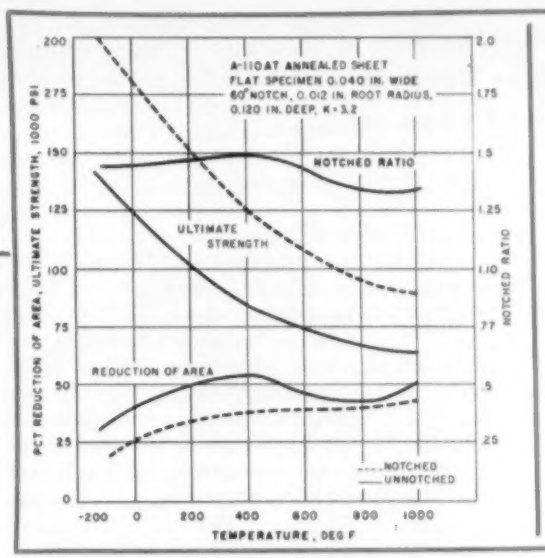


FIG. 2—Notched and unnotched tensile properties vs. temperature, A-110AT annealed sheet.

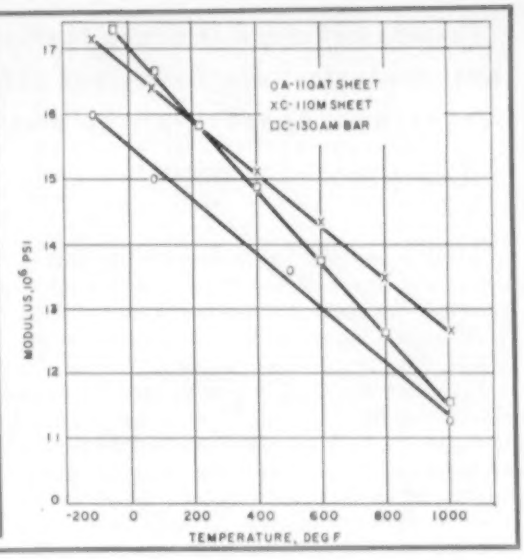


FIG. 3—Modulus of elasticity vs. temperature for A-110AT sheet, C-110M sheet, C-130AM bar.

strengthen titanium and reduce ductility. Loss in ductility is quite rapid with increasing additions of these elements and they are of little value in producing useful high strength alloys. They are present to some degree as contaminants in all titanium base materials and contribute the intermediate strength level of "commercially pure" titanium.

Aluminum and tin increase strength, particularly at elevated temperatures, and produce non-heat treatable, weldable alloys. Some sheet formability is sacrificed, however.

Additions of manganese, chromium, iron, vanadium and molybdenum generally strengthen the material with comparatively little loss in ductility and produce alloys that are generally easily worked and are heat treatable.

Combinations of these elements can produce alloys of six general types:

1. Interstitial all alpha alloys (carbon, oxygen and nitrogen).
2. Substitutional all alpha alloys (aluminum and tin).
3. Beta-strengthened, alpha-beta alloys (intermediate amounts to the beta stabilizing elements).
4. Alpha-strengthened, alpha-beta alloys (aluminum and/or tin plus beta stabilizers).
5. Unstable beta alloys (relatively large additions of beta stabilizers).
6. Stable beta alloys (large additions of certain beta stabilizing elements).

High strength alloys of types 2, 3 and 4 are available in tonnage quantities. Rem-Cru alloys typical of these types are: A-110AT, ternary 5 pct aluminum; 2½ pct tin, type 2; C-110M, binary 8 pct manganese, type 3; C-130AM, ternary 4 pct manganese, 4 pct aluminum, type 4.

Tensile properties of these alloys, annealed, are summarized in Fig. 1. All strength curves show the same general characteristic of titanium, namely strength decreasing rapidly with increasing temperature up to 400°F to 600°F. There is a leveling of the curve in the intermediate temperature region followed by a more rapid drop as temperature increases above the 800°F to 1000°F range. At temperatures below 800°F to 1000°F, C-130-AM shows the most attractive short term strength, followed by C-110-M and A-110-AT. Above this temperature, however, the two-phase alloys C-130-AM and C-110-M lose strength rapidly whereas the single phase all alpha A-110-AT alloy maintains useful strength up to at least 1200°F.

Stability of these properties in annealed material is good. This has been demonstrated by storing test specimens for various times at temperatures up to 1000°F and then testing for tensile properties at room and elevated temperature. These data were then compared with similar data obtained on unexposed specimens. Room temperature properties of C-130-AM (see Table) are shown after exposure for various times and temperatures and compared with properties before exposure. Properties are essentially unchanged by any of the conditions tested.

Notch sensitivity characteristics of A-110-AT have been investigated in tension by testing both notched and unnotched tensile specimens. Stress concentration factor of the notch was $K_t = 3.2$. Results are shown in Fig. 2. In the temperature range of (—110° to 1000°F), there was no tendency toward notch sensitivity.

"Results obtained in creep testing titanium base materials are somewhat unique because of the strength vs. temperature relation of titanium . . ."

Modulus of elasticity values, Fig. 3, show an essentially linear drop with temperature for all the alloys. In general all the alloys show a somewhat higher modulus than unalloyed titanium (15.5×10^6 at room temperature).

Fatigue characteristics were studied using rotating beam reversed bending and tension-tension tests, on both smooth and notched specimens. A of Fig. 4 summarizes the notched and unnotched S-N curves obtained on A-110-AT sheet at room temperature for both smooth and notched specimens. Tests were also run under tension-tension conditions with minimum stress equal to 25 pct of maximum stress.

Endurance limit above theoretical

Absence of fatigue notch sensitivity in this alloy is illustrated by the fact that the endurance limit of approximately 63,000 psi with $K_t = 2.0$ is about 65 pct of the unnotched endurance limit of 96,000 psi. Thus although the localized stresses at the root of the notch are doubled, the endurance limit is reduced only 35 pct. Similarly with $K_t = 4.0$, the endurance limit is 35,000 psi or about 36 pct of the unnotched strength. This is well above the theoretical 25 pct predicted by the stress concentration factor. B of Fig. 4 summarizes similar data for rotating beam fatigue of A-110-AT barstock.

C-130-AM shows the attractive fatigue characteristics found generally in titanium-base materials. Smooth and notched rotating beam fatigue tests have been run on this alloy. C of Fig. 4 shows results obtained on annealed barstock. An unnotched endurance limit of 90,000 psi is indicated, about 55 pct of ultimate strength. A notched specimen showed an endurance limit of 45,000 psi. As in the case of the all alpha alloy the strength reduction is less than that calculated from the stress concentration factor.

The Materials Development Laboratory of Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, has reported an unnotched fatigue strength of 60,000 psi at 600°F for C-130-AM in a reversed bending fatigue test, D of Fig. 4. Ohio State University has reported an unnotched endurance limit of 96,000 psi for C-130-AM at —180°F in a vibrating beam test. At —321°F an unnotched endurance limit of 130,000 psi was reported. Fatigue performance of this alloy is related to tensile strength in a similar manner at all temperatures tested.

Fatigue data for C-110-M is shown in E of Fig. 4 which summarizes tension-tension fatigue tests run on a Krouse direct stress machine with minimum stress equal to 25 pct of maximum stress. An endurance limit of 90,000 to 95,000 psi under these test conditions is indicated.

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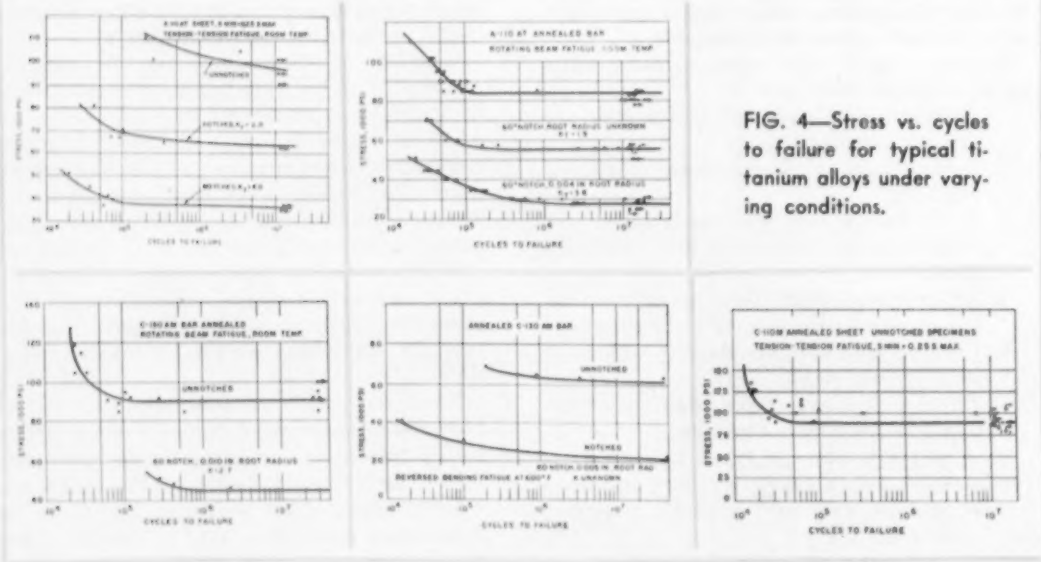


FIG. 4—Stress vs. cycles to failure for typical titanium alloys under varying conditions.

Fig. 5 summarizes stress rupture characteristics of A-110-AT, C-110-M and C-130-AM. These curves all show a noticeable slope at room temperature, are essentially horizontal in the intermediate temperature ranges (400° to 800°F for A-110-AT; 400° to 600°F for C-110-M and C-130-M) and again slope downward with time at higher temperature.

A fundamental relationship between time and temperature in the plastic deformation characteristics of titanium alloys has been shown. This is true for other materials but because of the strength vs. temperature relation of titanium the results obtained in creep testing titanium base materials are somewhat unique.

Strain, temperature effects similar

Investigations of the effect of various strain rates and temperatures on the observed strength of titanium alloys have shown that in regions where the strength changes rapidly with temperature it also changes markedly with strain rate or time. Similarly in regions where strength is not greatly affected by temperature neither does it change with time.

Comparison of stress rupture data with the short term tensile strength (Figs. 1, 2 and 3) illustrates this. At room temperature, tensile properties are changing fairly rapidly with increasing temperature. Similarly the stress rupture curves show a decrease in strength with time. In the intermediate temperature region both sets of data show a leveling, reducing the change in strength with both time and temperature. At higher temperatures (above 800°F for A-110-AT and 600°F for C-110-M and C-130-AM) strength again drops rapidly with both time and temperature.

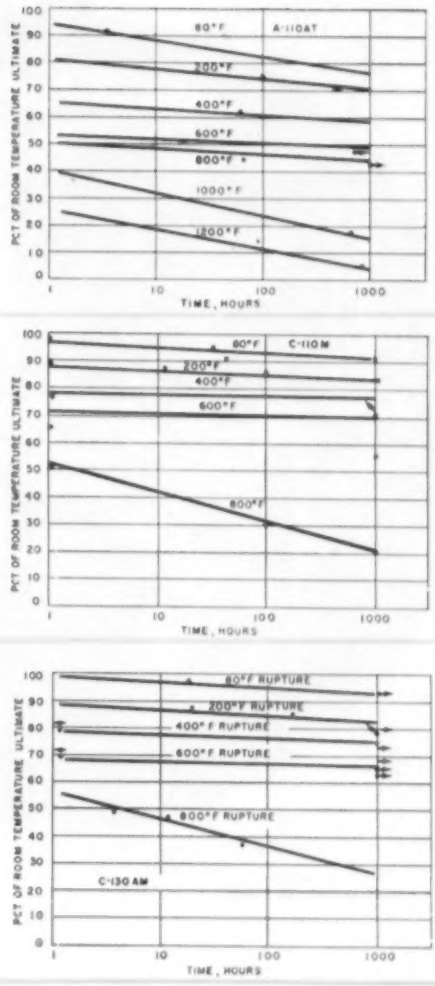


FIG. 5—Stress-rupture curves for typical titanium alloys tested at various temperatures: Top, A-110AT all alpha alloy; center, C-110M; bottom, C-130AM alloy.

Base Properties of C-130AM

Base Properties*	Room Temp.				600°F	800°F
Yield, 0.2 pct offset	133.2				101.5	82.9
Ultimate tensile	154.0				105.7	99.4
Elongation	17				9	12
	Stored at These Temperatures Tested at Room Temperature				Stored and Tested at These Temps.	
After 116 Hours	600°F	800°F	1000°F	After 112 Hours	600°F	800°F
Yield, 0.2 pct offset	147.3	145.2	139.3		99.7	81.8
Tensile	165.0	167.5	160.3		106.0	95.8
Elongation, pct	15	14	15		10.3	12.5
After 193 Hours				After 194 Hours		
Yield, 0.2 pct offset	134.9	148.1	130.5		100.4	83.4
Tensile	162.5	168.0	149.1		105.0	96.6
Elongation, pct	15	13	16		10.5	20
After 1000 Hours				After 1000 Hours		
Yield, 0.2 pct offset	143.6	147.4	130.3		102.3	83.5
Tensile	166.7	168.9	149.6		107.7	96.3
Elongation, pct	15	12	13		10	10**

* Strengths x 1000 psi. ** One sample broke at center punch gage mark. It is not included in this average.

START AND FINISH of austempering line is handled by one man. Once rack is loaded, wrenches move through heat treating automatically.

Bottleneck broken—

Mechanized Austempering Line Shortens Heat-Treating Time

◆ Austempering of wrenches in a new line using electric salt bath furnaces and mechanized conveyors has reduced processing time from 10 to 1¼ hours . . . Treatment is in three steps—austenitize, quench and draw.

◆ Distortion and cracking, previously major causes for rejection, are almost eliminated . . . Uniformity of hardness and greater impact strength are among other advantages . . . Elimination of scale has reduced finishing costs.

By H. K. JAMESSON,
Chief Metallurgist,
J. H. Williams & Co., Buffalo

MICROGRAPH shows the uniformity obtainable in the transverse structure of a 50B44 steel wrench (1000X).

◆ SALT-BATH austempering has not only relieved a serious production bottleneck at J. H. Williams & Co., Buffalo, but rejects of automotive wrench bodies and other tools are far fewer and finishing by grinding and sand blasting has been sharply reduced.

Previously, 10 hours were required to harden, draw and test a batch of adjustable wrench bodies. Distortion and cracking kept the reject rate high, and considerable time and effort were spent on removing scale. All of these conditions were remedied by installing a mechanized line of salt bath furnaces made by Ajax Electric Co.

The line consists of a 150-kw austenitizing furnace, an 80-kw quench furnace, a 70-kw draw furnace, a combined wash and rinse tank, and a synchronized "Jack Rabbit" conveyor mechanism. This latter term is derived from the hopping movement of the wrenches as they are transferred from one furnace to another by fast-acting conveyors.

Before the three-step austempering treatment, wrench bodies are forged from a 50B44 low-chrome boron-type steel. After machining and rough grinding, they are delivered to the heat-treating department where 24 wrench bodies are loaded on each fixture. From this point on, the operation is automatic.

The main chain conveyor moves the fixtures to the first quick-transfer conveyor. Pins in the transfer conveyor pick up the fixtures and carry them up, over and down into the austenitizing furnace where they again ride on the main conveyor. This pickup and release of fixtures is again repeated at the quench furnace and at the wash and rinse tank.

At the austenitizing furnace, wrenches are immersed in a molten bath at 1550°F for 15 minutes. This treatment is followed by quenching in the second furnace for 15 minutes at 500°F. The wrenches are then transferred to another salt bath and tempered for 30 minutes at 800°F. Washing and rinsing in a dual-chambered tank complete the austempering operation. The fixtures return over the heat-treating line and are discharged at the starting end just 75 minutes after they started their journey.

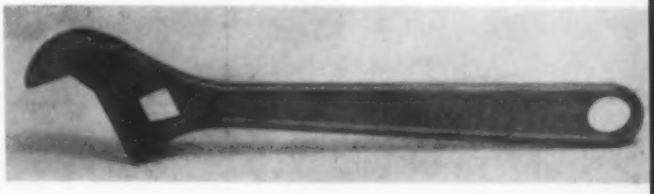
This is called three-step austempering. Better physical properties are obtained by an immediate draw at a higher temperature (800°F). The low-temperature quench has a faster cooling rate than the higher quench temperature of a two-step treatment. Thus, transformation of austenite to pearlite and ferrite is avoided.

The present operating rate is 450 lb per hour. One man can handle the entire setup, but the use of two men facilitates handling and enables spot checking to be done immediately following the drawing operation. The setup greatly reduces the amount of work processed at any one time.

Hardness tests are performed while the work is being processed. If values deviate from specifications, corrections can be made before the run is completed. Rejects and the amount of reworking are negligible. Processing which previously required about 10 hours per run has been reduced 87½ pct to only 1¼ hours.

Many other advantages have resulted from the change. The entire line occupies a floor space 46 ft long by 8 ft wide. The wrenches have greater uniformity of hardness and impact strength has been improved. Charpy impact tests show that strength averages 78.5 ft-lb at a hardness of 49 Rc.

The appearance of wrenches treated in the new line has also been vastly improved. After heat treating, the surfaces are scale-free. This means considerably less sand blasting, grinding and polishing. There is no longer a need to check for distortion because the results have been consistently good. Cracking, previously a major problem, has been eliminated entirely.



AUSTEMPERED wrench body has no distortion, no scale and no cracks. Molten salt bath treatment has virtually eliminated all rejects.

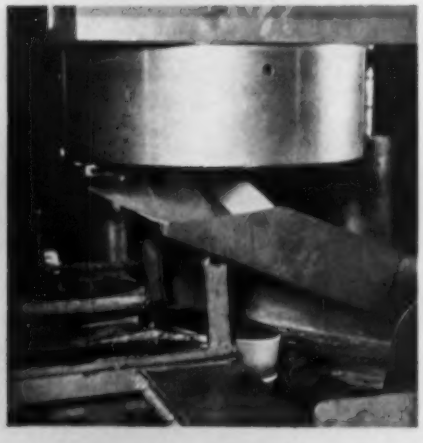
Presses Duplicate Machining Accuracy in Forming Stator Rings

◆ A precision press setup turns out 250 steel stator rings every hour to extremely close tolerances . . . Parts go into Buick's Dynaflow transmission. Loading slides and chutes handle parts in and out of press dies for maximum safety . . . Some trimmed scrap is saved to make other auto parts.

By HERBERT CHASE, Consultant, Forest Hills, N. Y.

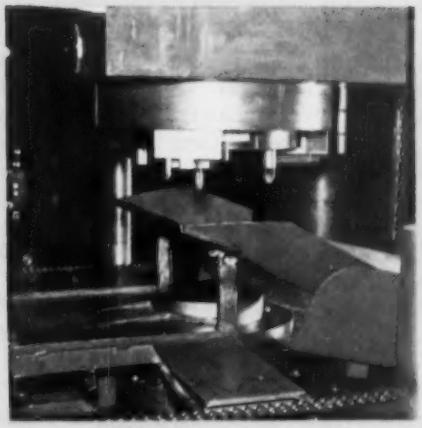
◆ FEW MASS PRODUCTION stampings of a size comparable to the stator ring for Buick's Dynaflow torque converter are produced within the close dimensional limits held on this part. These rings are made entirely on presses but critical dimensions are maintained as closely as many parts that are fully machined.

All operations on this stator stamping are performed within a small area in Buick's sheet



DRAWN cup, left, is air-ejected to chute at right as strip stock feeds to the blank and draw die.

SLIDE, right, loads cup in first trim die as attached chute directs trimmed cup toward next press.



SECOND trim setup removes cup bottom, uses feed slide and chute as in first trim press.

metal plant at Flint, Mich. Although the operations are not unconventional, they require good tooling and unusual care to attain and retain specified precision.

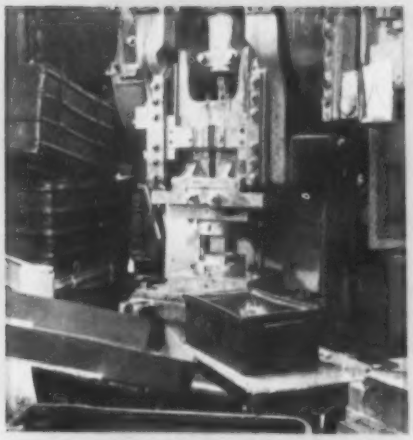
In finished form, the ring has what might be termed a "hat" section consisting of two wide flats between which there is an expanded U-shaped circumferential bead. One diameter on the ring must be held within 6.288 and 6.296 in. limits and its height (or width) must come within 0.966 and 0.976 in. There are also much closer limits on eccentricity and edge parallelism than are commonly held on drawn parts.

Stator ring production starts with a blank and draw operation on strip steel in a No. 30 Bliss press. A conventional die is used, but it is well made and designed to hold close size on diameter.

The steel strip material is 0.060± 0.001-in. thick and 9⅝-in. wide. It is a deep drawing grade and must have an excellent, scratch-free surface finish. Draw compound is applied to each strip before the press operator hand feeds it to a stop on the blank and draw press.

Immediately after the blank is produced it is drawn in the same die. Knockout occurs on the up stroke and the drawn cup is air-ejected into a chute. Waste is chopped off the strip after each draw and falls down another chute into a tote box. Drawn cups drop from the chute onto a belt that carries them through a washer to remove the draw compound.

Washed cups then travel to a Model trimmer where they are inverted and hand fed into a reciprocating slide. The slide advances until the cup drops over a punch. This punch fits the cup's inside diameter and centers the part in the trim die. The slide also carries a short chute that catches and ejects the trimmed cup as the die halves separate. This chute is withdrawn



RINGS from second trim press, top, come down chute (left), are hand fed to coining die (center).

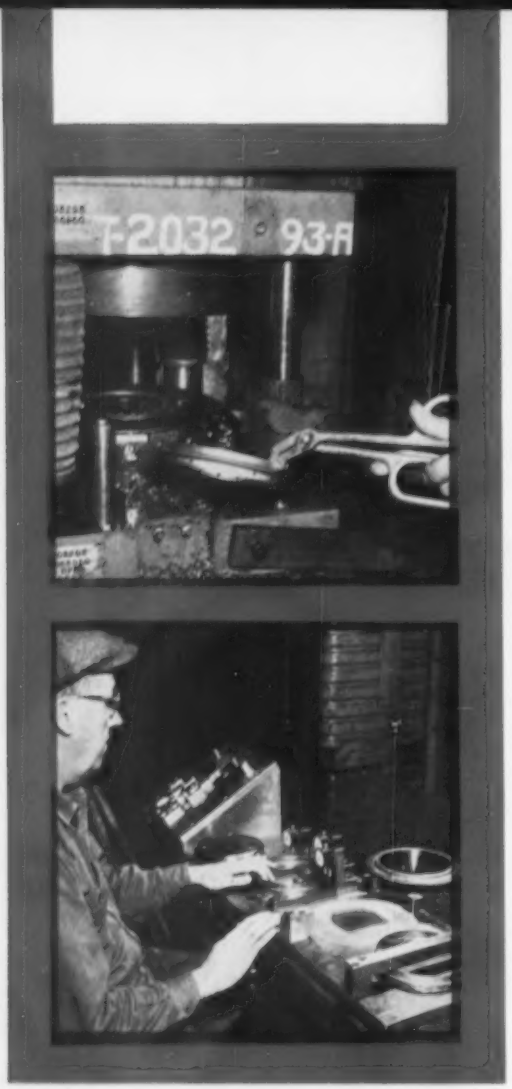
ANOTHER slide, bottom, with attached chute handles rings in and out of this bead-forming die.

with the slide before the die closes for trimming.

As the die closes, it first clamps the cup in trim position. The cup's lower edge is then trimmed off. Trimming occurs as the die is moved in four successive directions across knives that shear off a ring of scrap. This ring is cut into two pieces which fall onto belts and are dropped into scrap bins.

When the die opens, it lifts the trimmed cup. The slide immediately moves in again with a new cup and simultaneously carries the short chute below the upper die. A knockout releases the trimmed cup from the upper die half so that it drops into the short chute. The cup slides from this chute into still another one, and then to a belt. The belt advances the cup to the next trimming operation, also performed by a Model trimmer.

The cup is moved to trim position by a slide,



REMOVING ring from cam die, top, which forces 21 radial punches outward into lower section.

FINAL bench inspection, botom, checks rings for critical dimensions, parallel edges, roundness.

as before, but this die is designed to trim the upper edge by removing the cup bottom. Scrap from this operation includes the cup bottom which is used later for making another stamping.

All scrap is carried into a tote box, leaving a ring whose height is within 0.006 in. of that specified. This ring is elevated, knocked into a chute and conveyed to the next press.

Rings are hand loaded one at a time in the die of this third press. Here the ring edges are lightly coined to remove any irregularities and to help keep the edges square and parallel. After hand unloading, the coined parts are passed to a table.

From this table position, the rings are placed one at a time in a slide that feeds the die in another Bliss press. In this die the rings fit into annular grooves whose depth is about one third of ring height.

A punch fits the ring inside diameter so that when the press closes to apply pressure on both ring edges, the metal cannot move inwardly. Instead it is forced outward into a slot between the two die halves to form the U-shaped bead.

As the metal flows outward to assume the bead form, the width (height) of the ring decreases. This height must be held within 0.963 and 0.976 in. and is gaged to insure that these limits are maintained.

Beading is the final forming operation. Each beaded ring is elevated by the upper half of the die and is knocked out at the top of the stroke. Again, it drops into a short chute on the feed slide which moves in as the die opens.

To press-pierce the formed rings, each one is placed to fit the recess in a cam die. This brings the lower ring section into position for piercing 21 equally spaced holes. The holes are made as the die closes and the cam forces 21 radial punches in an outward direction.

Pierced rings are complete except for a gaging inspection. Gages are the same types that would be used if the part had been machined from a solid ring.

Inspection is critical

Inspections and measurements include (1) a check on the distance from hole centers to the nearest edge, which must be held between 0.238 and 0.242 in.; (2) an inspection for eccentricity and squareness; (3) gaging the diameter that must be held within 6.288 and 6.296 in. limits; (4) a check for rim width (0.966-0.976 in. limits); and (5) an inspection of edge parallelism. Rings that do not pass inspection are either rejected or salvaged if there is a favorable chance of correction.

Worker safety is an important consideration due to the confined area of this press setup. But accident potential is minimized by the reciprocating slides and attached chutes that automatically load and unload the various dies. Press operators' hands remain well away from the dies at all times, although it is necessary to use tongs in some instances.

While the transfer press installation could not be described as an automated operation, some degree of automation is achieved through the use of chutes and belts. These transfer stator rings from one process to another, and also serve to carry scrap pieces away for subsequent handling and disposal.

Overall production in this department is approximately 250 acceptable stator rings per hour. This rate is considered to be quite high in view of the nature and number of the semi-automatic press operations, the close tolerance limits and the careful gaging required.

Silver Alloy Brazing Offers Greater Freedom in Part Design

◆ Wider latitude in design and materials selection for a new sink faucet is permitted through the use of silver alloy brazing . . . All parts are wrought or brass tubing . . . Only the lightest polishing and buffing is needed to prepare the assembly for plating . . . Ingenious fixtures and gas-air heating are used.

By E. H. SMITH, Field Engineer, Handy & Harman, Detroit

◆ THE FREEDOM which modern techniques of silver alloy brazing offers to product designers is well illustrated by a new sink faucet—manufactured by Delta Detroit Corp.—a sleek and serviceable design using a single ball valve with a single control handle to regulate both hot and cold water flow.

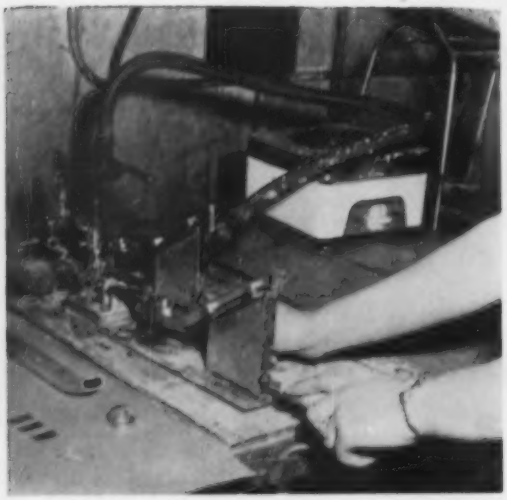
This unit has the operating advantages of a single moving part, spherical seats of uniform radius, single seal against leakage to the outside, and the complete range of adjustability for both temperature and flow.

Design for and assembly by silver alloy brazing permits all faucet parts to be made from wrought brass or drawn tubing. All surfaces are smooth and only the lightest polishing and buffing is required to prepare the assembly for plating. Further, wrought and drawn materials are denser and not subject to the porosity—an important factor in hydraulic service.

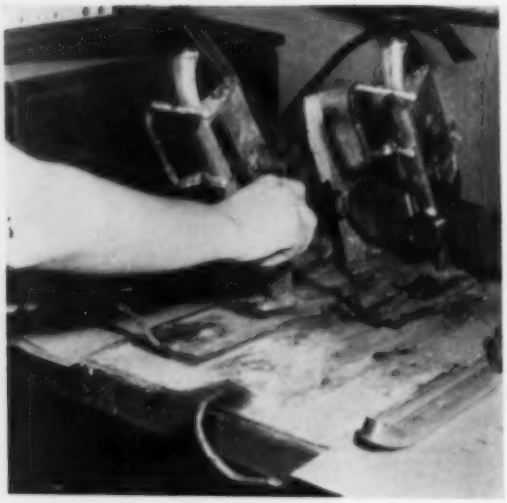
The spout design best shows what can be done with silver alloy brazing. The spout looks conventional and swings in the usual way about the valve body, but its construction is unique. Around the body is a hollow cylindrical sleeve sealed at each end with rubber O-rings. A drilled opening through the sleeve connects with a tube bent to form the spout. This tube, drawn from heavy brass, is flat on the bottom and sides but crowned on top. At the outer end of the spout there is a brass boss into which a separate aerator screws.

Both sleeve and boss are brass screw machine products. The tube is also brass, cut at each end to fit the mating component. At the boss end, the lower portion of the tube is cut away in a semicircle to remove all obstruction to water flow. This tube end projects over a step cut in the boss. Thus, the mating faces are the horizontal half-ring of the boss and the vertical step against which the end of the spout tube butts.

SILVER brazing permitted use of wrought brass or tubing in this single-handle faucet.



FIXTURE and heating arrangement used to join the spout tube boss by silver alloy brazing.



SLIDING-plate and wooden handle fixture construction for joining spout to valve sleeve.

Joints between the three parts must be tight, strong and corrosion resistant because the assembled spout may sustain occasional impact in service and corrosion might weaken the joints or destroy the plating. Silver alloy, Easyflow 45, is used, being easy to handle and having a strength equal to that of the brass itself.

Before brazing, ports are degreased in trichlorethylene. Fluxing is by brush and immersion in Handy Flux at all joint surfaces.

Three different fixtures clamp the parts into brazing position. A set of at least two fixtures are used at each brazing station. While the assembly in one fixture is under heat, the other can be quenched, unloaded and reloaded.

Each fixture has a toggle clamp, locating members, and a flat base with a wooden handle by which the fixture is located in the heating position, and withdrawn. At each brazing station a flat plate with guide rails positions the fixture as it is pushed into the heating position.

Assemble with parts inserted

Ceramic-lined, gas-air Superheat burners, using natural gas and air, are directed at each side of the assembly. The burners are on continuously since the interval between successive fixtures is only long enough to allow withdrawing one fixture and pushing another into place.

The spout tube and boss assembly is made with the parts inverted. The preplaced silver alloy consists of a 0.005-in. shim for the vertical surface between spout-tube end and boss, and an arc-shaped length of 0.042-in. wire for the lap between the tube's flat side and the horizontal half-circle of the boss. These preplaced forms are assembled with the parts after fluxing, the fixture locked, and the whole advanced to the heating position.

Flames strike the assembly near the joint so that the heat flows to all mating surfaces to bring them to brazing temperature (1145°F) at the same instant. All of the alloy is drawn into the joints uniformly. But there is enough material in the arc-shaped piece of silver alloy wire to leave a substantial fillet at the re-entrant angle between boss and tube for easy buffing and uniform plating.

After brazing, the joint shows very slightly, and even less after belt grinding. After buffing and plating it is invisible.

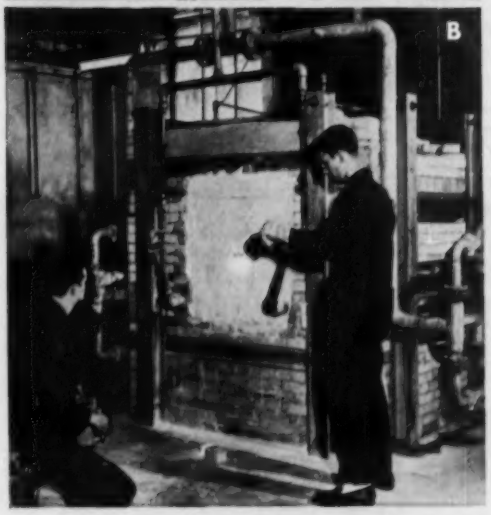
Joining the tub-and-boss assembly to the sleeve which surrounds the main valve body is done at an odd angle. The end of the tube is cut to fit the sleeve at this angle and the fixture locates the parts precisely as the locking toggle is closed. Location is such that the tube is centered over the hole in the sleeve side wall.

At this joint the arc-shaped length of Easyflo silver alloy on the sleeve is placed *inside* the tube. This permits the operator to see the emergence of the silver brazing alloy from the inside to all external points along the joint, and to eliminate runs and balls of excess material at this hard-to-polish re-entrant angle. The fillet can be precisely controlled by this inside feeding.

This second braze completes the spout assembly, after which the joints are polished flush on coated abrasive belts and tested. A test fixture seals the spout openings and admits air at 90 psi from a shop line to the interior of the assembly, and then submerges the entire assembly in water for the detection of leaks. So precise is the machining, fixturing and heating at Delta Detroit that leakers are extremely rare.

The same basic fixturing and heating method is used for connecting the copper tubing for the hot and cold water lines to the main valve body.

NEW B&W 3200 degree Refractory Concrete



Today, in some types of heating and melting furnaces, complete linings or sections of linings are subjected to temperatures over 3000 F and, with the trend to higher and higher operating temperatures, the problem of finding the most economical refractories for this "over 3000 F service" will become even more important.

Now, with B&W's new Refractory Castable-3200, furnace builders and operators can cut installation costs by using castable construction for services up to 3200 F. As easy to use as other B&W refractory concretes, B&W Refractory Castable-3200 can be poured or trowelled into place or applied with a cement gun.

Several years ago, B&W developed Kaocast, the first successful 3000 degree refractory concrete, to lead this high temperature castable trend. B&W Castable-3200, like Kaocast, is made with an alumina-silica base and is recommended for temperatures from 2600 to 3200 F. Because of its very high temperature properties, it is not recommended for temperatures below 2600 F.

If you have not taken advantage of the fast, low cost installation of castables for your high temperature requirements, we suggest you investigate B&W Kaocast and the new B&W Castable-3200. Your local B&W Refractories Engineer has all the facts.

A Mixed like structural concrete, B&W Refractory Castable-3200 can be poured, trowelled or gunned into place. • B High temperature laboratory furnace lined with B&W Refractory Castable-3200.

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Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 113.

Brazing

This 24-page manual is especially concerned with the application of the major brazing methods in joining metals using silver alloys and filler metals, fluxes and gas atmospheres. Tables, drawings and photos are included. Subjects discussed include silver brazing procedure, selection of metals, design and assembly of brazed joints. *Air Reduction Sales Co.*

For free copy circle No. 1 on postcard, p. 113.

Vacuum pumps

To supplement its complete catalog a 4-page 2-color bulletin has been prepared providing a quick, comprehensive view of a complete line of high vacuum pumps which are designed to create low absolute pressures in all fields of vacuum processing. *Kinney Mfg. Div., New York Air Brake Co.*

For free copy circle No. 2 on postcard, p. 113.

Tubing

Information of value to engineers and designers associated with the use of tubing for elevated temperature and/or pressure service is included in a data folder, which also gives the chemical analyses of the standard carbon, alloy and stainless tubing steels used in such service. *Tubular Products Div., The Babcock & Wilcox Co.*

For free copy circle No. 3 on postcard, p. 113.

Thermoucples

A 56-page bulletin on thermocouples and pyrometer accessories contains extensive engineering data on the selection and installation of the proper types of these accessories, as well as recommended thermocouples for installations in the chemical, metalworking, iron and steel industries. *The Bristol Co.*

For free copy circle No. 4 on postcard, p. 113.

Machining

"Contour-matic" machines — machines that saw, file, polish and grind and which feature unique, hydraulically-powered tables and controls, are described in a colorful 20-page catalog. Graphic examples are given in production applications. A section on manually operated sawing machines is included. *Do-ALL Co.*

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adds a magic touch

Hendrick Ornametal

More and more metal fabricators are realizing the sales benefits that stem from using Hendrick Ornametal in their product design. Whether you require perforated metal for radiator enclosures, stove panels, kitchen cabinets, clothes and broom closets, lockers or similar applications, you can be certain there's a Hendrick Ornametal design suited for your exact needs.

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FREE TECHNICAL LITERATURE

Air power

A new engineering service bulletin points out that power losses in compressed air lines are frequently as much as 30 to 50 pct. It describes how to find out if more air is being wasted than the repair and renovation of the distributing system would cost. The bulletin contains diagrams of different types of piping networks and tables of friction losses of air in pipe, fittings and hose. *Ingersoll-Rand Co.*

For free copy circle No. 6 on postcard, p. 113.

Crane-excavator

Thoroughly descriptive bulletins combining complete descriptions and specifications of the full ¾-yard crane-excavator have just been released. A custom-made crane excavator at production-line cost is explained. *Wayne Shovel & Crane Div., American Steel Dredge Co.*

For free copy circle No. 7 on postcard, p. 113.

Gunning practices

Basic Refractories, Inc., announces a new full-color, illustrated 12-page booklet which discusses the history, development, and current gunning procedures in openhearth and electric steelmaking furnaces; miscellaneous steel plant operations; and the foundry and copper industries. *Basic Refractories, Inc.*

For free copy circle No. 8 on postcard, p. 113.

Electronic bath

In a new 4-page bulletin, Fisher technical writers explain the reasons behind the development of a high-sensitivity constant temperature bath, its theory and operation. A description of the world's first 100 pct electronic bath important in petroleum laboratories is described. *Fisher Scientific Co.*

For free copy circle No. 9 on postcard, p. 113.

Automation

A new 12-page 2-color catalog describes automation machines, special machine tools and mill-balancing machines. Also transfer machines, center column machines and special machines for a wide variety of metalworking operations. Design and manufacturing facilities are also briefly described. *Snyder Tool & Engineering Co.*

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Turn Page

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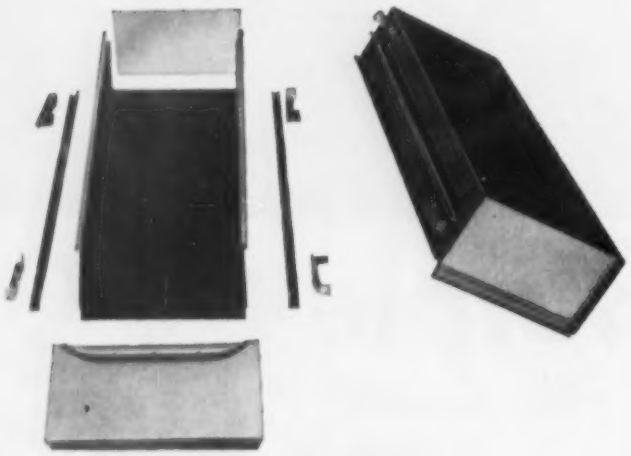

Desk drawer units in the new General Fireproofing Generalaire* line of metal office furniture are assembled and welded on special automatic resistance welder designed and built by Federal.

Nine separate parts are spot and projection welded in this machine to produce a complete drawer assembly. Dual shuttle fixtures are employed permitting maximum utilization of the welder. While one fixture is being loaded and reloaded at one end of the machine, the fixture on the opposite end is in the welding station. With an operator at each fixture loading station, a total hourly production of 300 drawer assemblies can be obtained.

Built-in rapid adjustment that will accommodate four different drawer sizes and "swing out" gun mounts for easy maintenance are two of the many features designed into this machine. It's another reason why Federal **Stays — First in Resistance Welding.**

For further details write for special bulletin TD-22 or contact the Federal representative nearest you.

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FREE TECHNICAL LITERATURE

Stud welding

This 6-page folder describes methods for the stud welding of standard concrete anchors for curbing, column guards, protective platform installations, door frames and other fabricated architectural components, as well as for bridge expansion dams and other structural applications. *Nelson Stud Welding Div., Gregory Industries, Inc.*

For free copy circle No. 11 on postcard, p. 113.

Standard washers

This new 21-page catalog contains full listings on 16 types of standard washers, in addition to concave and cupped type expansion plugs, wide rim and narrow rim machinery bushings, special tapped nuts, and ball bearing assemblies. Drawings of 48 widely used designs in special washers are included. *The Master Products Co.*

For free copy circle No. 12 on postcard, p. 113.

Shaped wire

A 16-page illustrated book describes ways of reducing machining costs with shaped wire. Complete figures are given for calculating areas and weights of the more common shapes. Uses for the wire are given, and charts and hardness conversion tables are included. *Page Steel & Wire Div., American Chain & Cable Co.*

For free copy circle No. 13 on postcard, p. 113.

Pipes & tubes

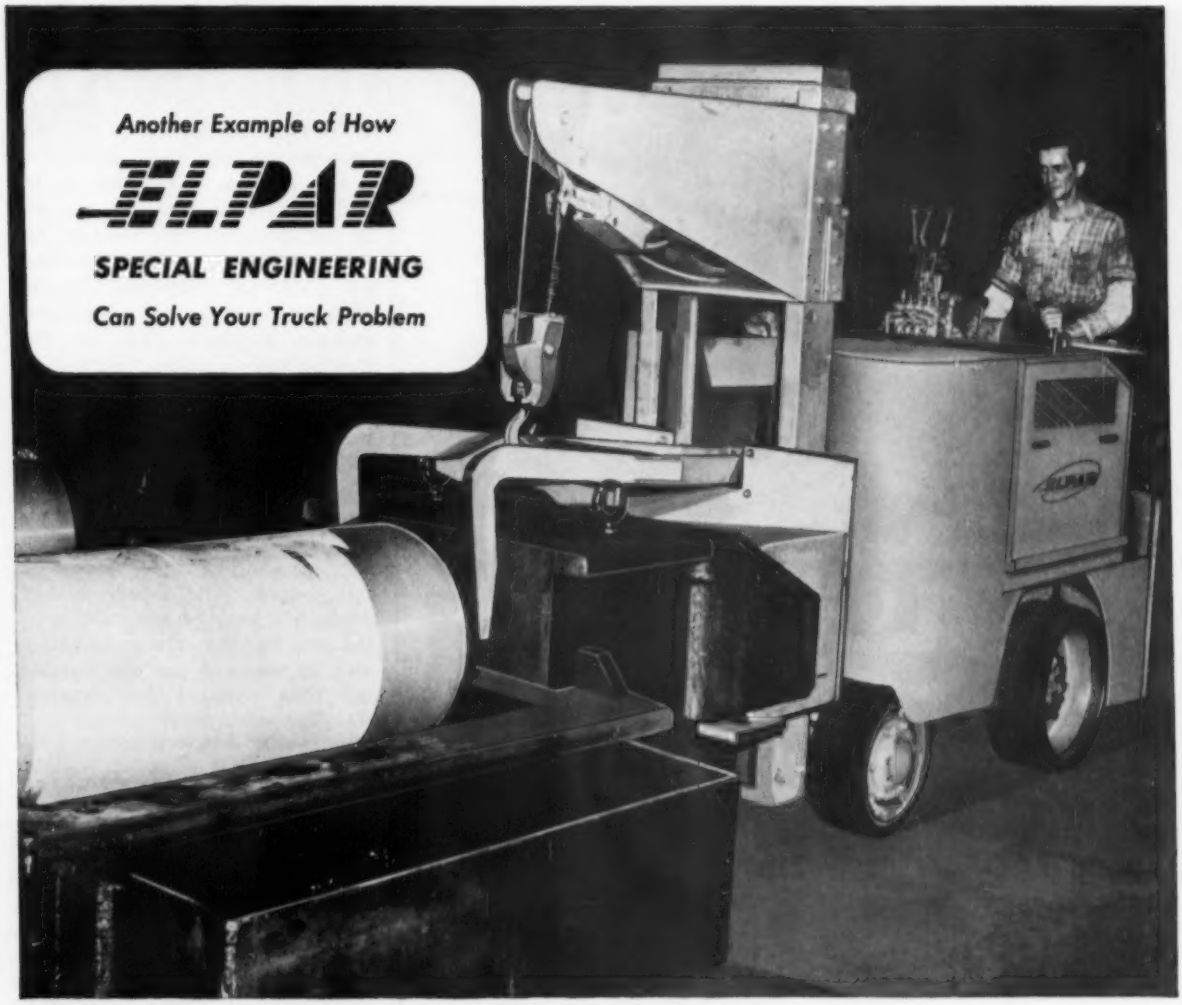
Said to be the most comprehensive authority ever published on the general subject of straightening ferrous and nonferrous pipe and tube, this new brochure reviews the many uses for tubing that have developed in recent years. Two basic straightening methods are analyzed in this 24-page booklet. *Mackintosh-Hemphill Co.*

For free copy circle No. 14 on postcard, p. 113.

Blast cleaning

Applications of abrasive blast cleaning to problems encountered in the steel milling industries and in industries concerned with processing of steel mill products are described in this new bulletin "Eight Steps to Lower Cleaning Costs." *American Wheelabrator & Equipment Co.*

For free copy circle No. 15 on postcard, p. 113.



Painless Extraction

The Problem

Steel mill needed a better, safer means of pulling bearings from ends of mill rolls . . . Job was done by a 75-ton bridge crane. This tied up a $200,000.00 piece of production equipment on maintenance work. Also, there was danger when bearings stuck, for then the crane often pulled the entire roll out of the rack, slewing it across the floor.

The Solution

ELPAR ENGINEERS collaborated with mill personnel to adapt an ELPAR fork truck for bearing extraction. The forks were replaced with a pair of arms and a ram, both hydraulically operated. As the ram pushes against the roll shaft, the arms readily pull off the bearings. When free they are carried by a boom and hook also added to the truck.

The Result

Bearings are extracted safely, smoothly, and under complete control at all times. Services of a valuable production crane are no longer required.

For *your* unusual load or handling problem, take advantage of ELPAR Special Engineering. It is available without obligation when a standard ELPAR model will not suffice.

NEW BOOKLET

Explains this unique special engineering service in detail. Write The Elwell-Parker Electric Company, 4295 St. Clair Ave., Cleveland 3, Ohio.

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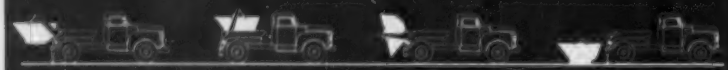

picks up hauls dumps puts down

WHAT IT IS

The BROOKS LOAD LUGGER is a flat-bed truck body with a pair of hydraulic-powered hoisting arms, which is mounted on any truck chassis of suitable capacity. Standard models lift pay loads of up to 18,000 pounds at a time. Some special-purpose models lift much heavier pay loads.

LOAD LUGGER CONTAINERS are patented, tilt-dumping containers with deep, leak-proof bottoms. Capacities range from 1½ to 14 cubic yards for standard models. Some special-purpose models are much larger. A variety of open and closed containers handle solid materials, powders, sludge, liquids, and gases. Special pallets handle free-standing and unit-packaged materials.

Controlled by the driver from his cab, the truck-mounted Brooks Load Lugger lifts a Load Lugger Container onto its steel deck, carries it well forward for correct load distribution, cradles it between steel sidewalls for travel safety, hauls it away, dumps or spreads its contents, then returns the container and puts it down.

HOW IT IS USED

The LOAD LUGGER SYSTEM of materials handling calls for a number of Load Lugger Containers to be placed at points of need. These containers collect material as it accumulates, which reduces handling and eliminates loading crews. Then, loaded containers are picked up, hauled away, dumped, and returned on a regular schedule by a truck-mounted Brooks Load Lugger, which replaces many conventional trucks and eliminates loading time formerly required.

WHO USES IT

Industrial operations all over the country (quarries, foundries, steel mills, paper mills, refineries, chemical plants, brick plants, metal fabricators, etc.) use this versatile equipment to handle raw materials, finished products, and waste materials. Contract haulers of wet and dry refuse prefer Load Lugger equipment, as do scrap metal dealers, construction contractors, cemetery operators, and sugar cane growers. Government approval is evidenced by the many municipal, state, and federal installations. New uses and new users, such as cable reel handling by power and telephone companies, are constantly coming into the picture.

WHY THEY LIKE IT

The Brooks Load Lugger has no cumbersome superstructure or extra operating gadgets because of its patented simplicity, clean design, and sturdy construction. This results in a lower first cost, lower maintenance costs, the ability to carry more pay load on a given truck chassis, and a clear deck for multipurpose use. Its double-acting hydraulic cylinders, four-point container suspension, secure container cradling, and fully controlled tilt dumping are important contributions toward greater operational safety.

Load Lugger Containers are job-designed and job-proved. They are low and easy to load to full rated capacity. They dump clean because they are tilt-dumping, and they have no bottom openings to allow messy or insanitary leakage. Appropriate models are dust-proof, rat-proof, fly-proof, and almost odor-proof.

BROOKS EQUIPMENT & MFG. CO. 2034 DAVENPORT ROAD KNOXVILLE, TENNESSEE

Industrial tape

Actual industrial tape samples, mounted in a descriptive, informative catalog, are now available in a new catalog. Each tape is described as to composition and use in the industry. Specification figures and properties (backing, thickness, adhesion, tensile strength, etc.) are presented. *Polyken Products Dept. of The Kendall Co.*

For free copy circle No. 16 on postcard, p. 113.

Welding

The performance and applications of a new consumable electrode inert gas welding process is given in a new booklet. It also describes fillet, lap, butt and plug welds made with this process. The 7-page booklet points out how the arc stability of the new process effects operating costs in terms of gas consumption and time required for cleaning. *Westinghouse Electric Corp.*

For free copy circle No. 17 on postcard, p. 113.

Millivoltmeter

The latest addition to the line of Brown millivoltmeters is described in this bulletin. The new controller introduces a new three-zone control form that is adjustable from 0 to 100 pct or from 0 to 10 pct of full scale, as desired. Complete specifications, list of control forms and drilling dimensions are included. *Minneapolis - Honeywell Regulator Co.*

For free copy circle No. 18 on postcard, p. 113.

Cutting jobs

A new idea booklet "New Ways to Make Money on Your Cutting Jobs" is now available. Departing from the usual "catalog" format, the booklet justifies capital goods expenditure by pointing out the various ways in which the firm's machinery can reduce costs and increase profit margins for the user. A major portion of the booklet discusses those considerations normally investigated by management when selecting efficient equipment. A graphically illustrated time-motion study emphasizes the need for top efficiency in both operator and equipment to meet the needs for high-speed production methods. *De Walt Inc.*

For free copy circle No. 19 on postcard, p. 113.

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on page 108

O-rings

A complete catalog about Garlock O-Rings gives design information, recommended pressures, and available materials for both "dynamic" and "static" application. It also contains a list of standard O-Ring sizes. *Garlock Packing Co.*

For free copy circle No. 20 on postcard, p. 113.

Adjustable shelving

An attractive 2-color, 4-page folder which points up in photographs, cartoons and text, the outstanding features of Pressed Steel Co.'s new Hallowell adjustable steel shelving is now available. Also featured are various combinations of swinging and sliding doors. *Standard Pressed Steel Co.*

For free copy circle No. 21 on postcard, p. 113.

Fork trucks

"Facts About Fork Trucks — The Gas vs. Electric Question" is the title of a new folder which presents an objective study of the capabilities of gasoline and electric-powered fork trucks operating under normal conditions. Twelve fact sheets answer many questions about cost, dependability, service life. *Lewis-Shepard Products, Inc.*

For free copy circle No. 22 on postcard, p. 113.

Torque converters

An 8-page, 4-color catalog describing Torcon torque converters is now available. Extensively illustrated, the brochure depicts models, shows attachments for specific adaptations, and describes construction of the converters. *Clark Equipment Co.*

For free copy circle No. 23 on postcard, p. 113.

Gears

The Okonite Co. is offering a new booklet on rubber-insulated Loxarmor cable constructions, a cost-saving cable design for use in racks or trays for applications where rigid conduit systems are either unnecessary or undesirable. Current carrying capacities, dimensions, installation and handling techniques are included. *The Okonite Co.*

For free copy circle No. 24 on postcard, p. 113.

Packaging

This new 36-page "Blue Book of Packaging" contains an interesting history about steel strapping, cost saving and material charts, typical application photographs and a complete illustrated resume of the USS Gerrard product line. *Gerrard Steel Strapping Div., U. S. Steel Corp.*

For free copy circle No. 25 on postcard, p. 113.

Roll grinding

Two products of vital importance for grinding and preserving work or parts with exacting tolerances, such as work rolls for steel mills, are detailed in a special bulletin on roll grinding. *E. F. Houghton & Co.*

For free copy circle No. 26 on postcard, p. 113.

Pumps

The small but mighty pump which is playing an increasing role in American industry and home life is described in a 24-page booklet, marking this company's 75-year anniversary of pump manufacturing. *The Deming Co.*

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Machine tools

Emerman has recently printed a new 32-page illustrated booklet showing the general diversifications of the actual machines which they own and have in stock. Emerman is the originator of the rental plan covering machine tools, a brief explanation of which is included in the booklet. *Emerman Machinery Corp.*

For free copy circle No. 28 on postcard, p. 113.

Turbine-generators

Turbine - generators, rated from 2500 kw to 40,000 kw, are described in a new booklet designated GEA-3277C. Condensing and noncondensing applications for electric utilities and industrial plants as well as special turbine applications are covered in detail in the new publication. *General Electric Co.*

For free copy circle No. 29 on postcard, p. 113.

Lifetime gears

This new engineering manual describes the complete line of Duti-Rated Lifetime Gearing. All standard gear sets available are listed by center distance and capacity to give designers the most complete and convenient selection possible to suit specific applications. *Foote Bros. Gear & Machine Corp.*

For free copy circle No. 30 on postcard, p. 113.

Solenoid valves

A new general catalog of solenoid-operated valves has been prepared by the Skinner Electric Valve Div. The catalog describes five basic electric valves and discusses their possible variations. Also explains how to choose correct valves for specific applications. *Skinner Electric Valve Div., Skinner Chuck Co.*

For free copy circle No. 31 on postcard, p. 113.

Tool grinder

A helpfully illustrated booklet describes the latest addition to the Cincinnati line of machine tools. This No. 1 Cutter and Tool Grinder is designed for grinding and reconditioning miscellaneous small tools and cutters. *The Cincinnati Milling Machine Co.*

For free copy circle No. 32 on postcard, p. 113.

Fabrication

Fabrication problems involved in the production of intricate sandwich-type aircraft components are discussed in the initial issue of a new, non-technical industry bulletin. This bulletin, "Narmco News," will be published periodically as a non-technical review of interesting aircraft production problems. *Narmco Mfg. Co.*

For free copy circle No. 33 on postcard, p. 113.

Chemical products

A new folder containing up-to-date information on Kaiser Chemical products and services has been prepared and is now available. A complete list of products and a convenient table giving data on formulas, grades, containers, shipping points and consuming industries are included. *Chemicals Div., Kaiser Aluminum & Chemical Sales, Inc.*

For free copy circle No. 34 on postcard, p. 113.

Roller bearings

This 52 - page handbook is an abridged edition of the 142-page McGill Bearing Catalog. It contains sections on the sealed Guiderol bearing, Camrol and Multirol series of full-type roller bearings, and is helpfully illustrated. *McGill Manufacturing Co.*

For free copy circle No. 35 on postcard, p. 113.

Mass spectrometer

An interesting 15-page illustrated booklet explains the consolidated type 21-103C mass spectrometer, and the application of mass spectrometry to the fields of industrial development, laboratory analysis and problems in research. Also lists users of the spectrometer. *Consolidated Engineering Corp.*

For free copy circle No. 36 on postcard, p. 113.

Sprue mills

Specially designed mills that clean sand from foundry sprue so that only cleaned sprue is charged into the cupola, effecting savings in coke consumption, are described in this new bulletin. Dimensions of three standard sizes are given. *C. O. Bartlett-Snow Co.*

For free copy circle No. 37 on postcard, p. 113.

Stainless steel

Complete details on Carpenter 7Mo stainless tubing and pipe are contained in a new product bulletin issued by the Alloy Tube Div. The alloy, which combines resistance to both general corrosion and stress corrosion cracking, is described by analysis, physical characteristics and mechanical properties. Uses are outlined as well as the steel's corrosion and oxidation resistance. *Alloy Tube Div., The Carpenter Steel Co.*

For free copy circle No. 38 on postcard, p. 113.

Aluminum plant

"Welcome to Listerhill" is title of a new booklet just issued by Reynolds Metals Co. to describe its first aluminum production plant, named for Alabama's Senator Lister Hill. Listerhill has pioneered new and improved production methods, and repeatedly established new production records. The original plant at Listerhill was the world's first completely integrated bauxite-to-sheet operation. *Reynolds Metals Co.*

For free copy circle No. 39 on postcard, p. 113.

Airtube system

A 4-page 2-color booklet describing a newly-developed prefabricated Airtube system is offered by the manufacturer, Lamson Corp. It describes the system, suggest a variety of arrangements for installing the equipment in any type of building, and lists all components furnished in the "kit." Also provided are instructions for laying out and installing the double-tube system, including plan and side-view drawings. *Lamson Corp.*

For free copy circle No. 40 on postcard, p. 113.

Materials handling

An interesting booklet on Tow-Bear tow trucks gives specifications of the standard model and all-purpose model. The machine is designed expressly for multi-item loads. It answers the need in grocery, drug, hardware and parts warehouses, in railway freight and baggage yards, and in large or small plant operations. *Tow-Bear Div., Hudson House, Inc.*

For free copy circle No. 41 on postcard, p. 113.

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. . . are severe

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Pearlitic malleable has high fluidity that casts easily into complicated shapes. It resists wear under heavy loads at high speeds . . . has high ultimate strength . . . possesses excellent non-seizing properties for bearing surfaces . . . can be given a very smooth finish where desired . . . and can be either liquid quenched or air quenched. And perhaps *most important of all, pearlitic malleable machinability index ranges from 80 to 90* (B1112 steel = 100).

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DESIGN: Skid Rails Improved

Service life of skid rails has been doubled through use of nickel-chromium alloy . . . Improved design has also been possible with the new material . . . Maintenance costs cut.

In changing from medium manganese skid rails to cast nickel-chromium rails one company has doubled the service life of the parts. The Chicago plant of the Ingersoll Steel Div., Borg-Warner Corp., increased the life of the skids and effected a weight saving of about 35 pct.

Permits Better Design

This permitted Ingersoll engineers, in cooperation with engineers from a high alloy foundry, to achieve a more satisfactory design. A salient feature of the new design is the allowance for expansion and contraction which was achieved by leaving one end of the skids free to move.

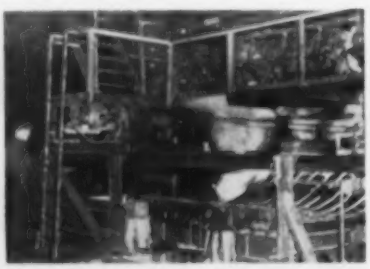
Use At High Temperature

Because of the conditions present at the discharge end of the two billet reheating furnaces used at this plant, type HT cast alloy, 33-37 pct Ni, 13-17 pct Cr, 0.35-0.75 pct C was chosen for the job. The furnaces operate at about 2300°F, and temperatures at the rails are about 1800°F. This cast alloy can be used satisfactorily at temperatures up to 2100°F in oxidizing atmospheres, and up to 2000°F in reducing atmospheres.

In the Ingersoll continuous reheating furnaces, the steel is moved through at a continuous high rate by a pusher at the charging end. As each cold piece is pushed into the furnace, a heated piece is discharged through a door to the mill table by means of the skid rails.

Needs No Cooling

In addition to longer life, other economies can be effected by changing to high alloy skid rail construction. In many plants, for example, water cooled skids made of non-heat resistant metals are being replaced by type HT cast skid rails. This makes water-cooling equipment unnecessary, and thereby reduces attendant maintenance costs.



Resists heat, wear . . .

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 113. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Construction:

New framing material speeds structural work.

A new, fully-locking framing material allowed the Martin Aircraft plant in Baltimore to assemble, install and load 25 large bar storage racks in just four weeks.

Each of the twenty-five units is 10 ft wide, 12 ft 6 inches high and 20 ft deep and contains 80 compartments, each compartment designed for a 4000 lb load. One complete section will support 160

tons of steel and features a 5 ft catwalk in front of the upper section to facilitate loading and unloading from the upper tier.

The new framing material, called Mult-A-Frame, is made by Mult-A-Frame Div., Ainsworth Mfg. Corp., Detroit. Structures made with the new product can be easily dismantled for moving or to meet new requirements.

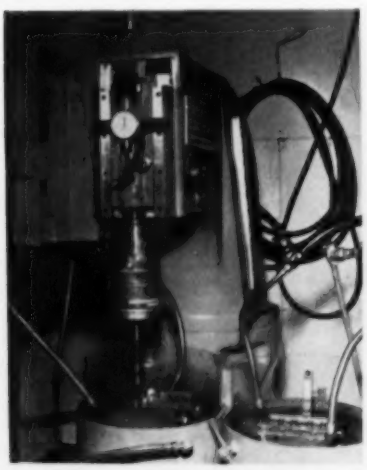
Machining:

Precise rectangular holes machined ultrasonically

Jet aircraft are highly responsive to slight changes in their ailerons, rudders and elevators. To move these controls, hydraulic fluid must be fed in precise amounts. And to accomplish this, Chance Vought Aircraft, Inc., ran into a tough problem when it tried to machine several precise rectangular-shaped holes in a sleeve feeding the fluid into the control system.

After working on the problem for more than a year, the tool research engineers came up with the answer. They used an ultrasonic machine whose tiny bit cut its way through the sleeve by bombarding it with minute boron carbide grit and air bubbles.

The job called for a rectangular slot 0.050 in. wide and 0.125 in. long for one type sleeve and 0.030



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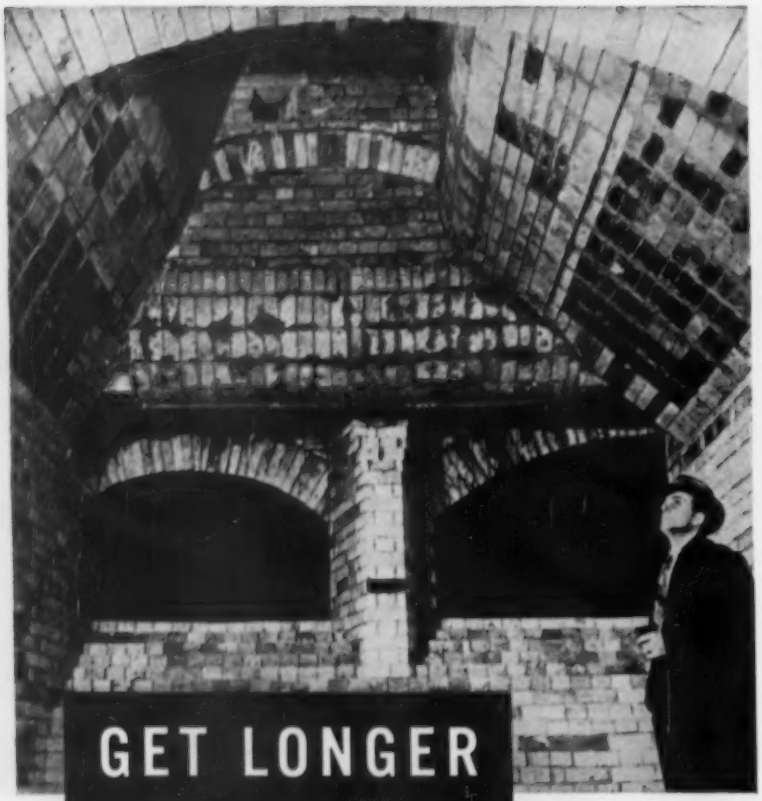

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Use this 5-point LACLEDE-CHRISTY MAINTENANCE PLAN

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5. Use refractories available from stock in a nearby Laclede-Christy or distributor warehouse—or direct from a Laclede plant. Shipment in most cases two or three days within receipt of order. Call or see your Laclede-Christy representative soon.

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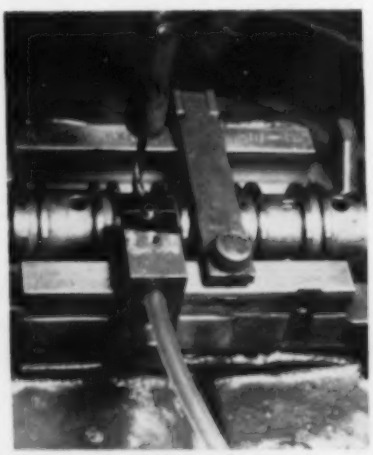
by 0.125 in. for another. Extreme tolerances were set up both for the dimensions and locations of the slots since the amount of fluid fed through the holes was exactly metered.

Other Methods Tried

First, piercing was tried by making the hole slightly undersize and finishing with a shaving operation. This produced a bad "break-out" on the inside diameter, the most important part in terms of oil flow. The second method was to machine three sleeves with the orifices milled into the edges of two, then join the three together. This failed because a perfect fit, preventing fluid leakage, could not be attained.

Ultrasonic machining was tried next, using a Cavitron machine. It involves use of high-frequency alternating current which oscillates a bit 30,000 times a second. Instead of riding directly on the metal sleeve, the bit is immersed in an abrasive slurry of boron carbide grit suspended in water. The high-speed movements of the bit strike the grit and drive it against the sleeve surface.

When the tool tip's ultrasonic waves travel through the water, they produce compressions and vacuums, the latter forming small bubbles of vapor. This is called cavitation, which creates tremendous pressures when the bubbles collapse. These pressures break off the high points of metal, so



Sleeve being machined . . .

Rough hole and final sizing hole are cut . . . Boron grit does work.

that the cutting process is more rapid than simple abrasion.

Because the action wears away the tool faster than the hole, a rough cut has to be made first. A new bit is then brazed to the vibrator unit and an exact hole made to specifications. At no time does the bit touch the metal sleeve. All work is done by the boron grit and air bubbles.

Grit and Bubbles Do Work

Tool engineers adapted the machine for the job in a couple of weeks. The machine had two work chucks and abrasive-coolant collectors, one for a heavy 280-grit abrasive for the rough cut and the other for 800-grit for the finished slot. The slurry was a 60-40 grit-water mixture which was used over and over again.

This slurry has five functions: (1) Supply water to effect cavitation, (2) Water for cooling the material, (3) Water to wash out small steel particles removed from the work, (4) Supply grit to rough up the surface to accelerate cavitation, and (5) Supply grit to give a fine surface finish on the side of the tool as it cuts through the slot.

Precision a "Must"

Corners had to be sharp to a 0.002 in. maximum radius, the slots symmetrical about the centerline to 0.001 in., sides of the slot straight within 0.0002 in. at the internal diameter and the four edges of each orifice perpendicular within 0.001 in. finished indicator reading at the inside diameter. There could be no burrs or breakouts and the maximum allowable stagger of the orifices could not exceed 0.001 in.

Specially-built brass jigs to resist corrosive and erosive action of the slurry had to be used. These jigs located the sleeves axially, rotationally and symmetrically about the centerline. The jig was a V-block with a diamond-pin in the bottom for rotational align-

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are Safest with...
Bailey thermal expansion
GOGGLE VALVES
One of nature's most dependable forces—the linear expansion and contraction of steel—frees and clamps the goggle plate of these valves. Steam applied to three sets of tubes causes expansion which frees the goggle plate for swinging to either open or closed position. When steam is removed, contraction of the tubes forms a tight, safe, leakproof seal. Can be operated by hand in case of steam failure.
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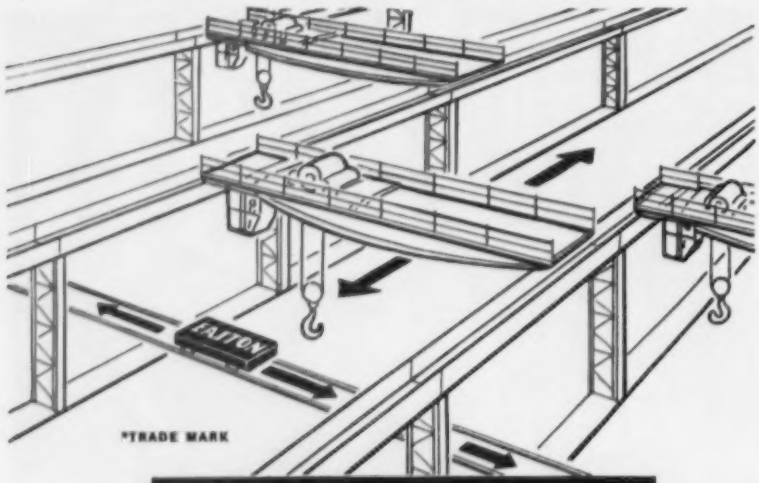

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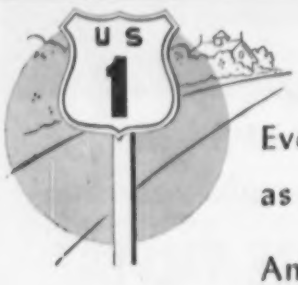

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ment and an end plate positioning the sleeve axially by fitting against a ground shoulder of the sleeve. Clamps secured the sleeve against the V and to insure proper fitting against the end plate.

Sheffield plunjet air gages were used in conjunction with a Sheffield column-type Precisionaire gage to locate the tool bit relative to the sleeve prior to machining.

Tool Rigidity Important

It was important that the tool bit be attached securely to the tool holder. Not only was continuity (free of cracks and gaps) necessary between the two components, but it was essential that the axis of the bit be paralled with the ways of the vertical head. The former was maintained by brazing the tool bit to the tool holder in a specially-built jig. The latter was accomplished by movement of the plunjet across the bit both laterally and longitudinally. Any slight misalignment was corrected by a push with the finger or a slight tap with a hammer.

Inspection was made with a 50-power microscope at the inside diameter of the sleeve by viewing through an orifice on one side of the sleeve to the inner edge of another diametrically opposite. All orifice qualities were held to well within tolerance.

An average maximum stagger for four slots was 0.0005 in. Corner radii were generally held to less than 0.001 in., and edge straightness, squareness and symmetry were as close as could be measured with the microscope. Edge sharpness at the inside diameter was excellent while a slight taper of around 0.002 in. was evident through the depth of the slot.

Two chucks . . .

Plastics:

High-strength sheet resists corrosion, moisture.

A new polyvinyl chloride rigid sheet is said to be an ideal construction material for self-supporting electroplating tanks, ducts and exhaust hoods for corrosive fumes. It can also be adopted to laboratory ware such as beakers, bottles and funnels for handling, storing and transporting corrosive liquids and solids. The new product is made by Bakelite Div., Union Carbide and Carbon Corp.

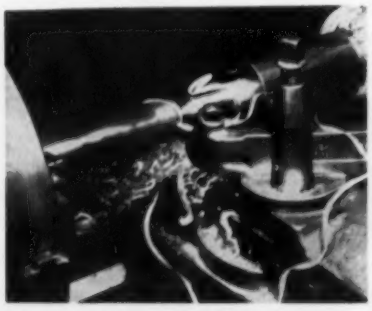
Bakelite rigid polyvinyl chloride sheet has high impact, tensile, flexural and welding strengths, combined with excellent resistance to chemicals and moisture, and a high heat distortion point. It meets Society of the Plastics Industry specifications for Type I rigid sheet for structural purposes.

Easily Machined

The new material, in sheets as large as 4½ x 10 ft is easily machined and fabricated.

Like Bakelite vinyl copolymer sheets, the new sheet product is self-extinguishing. Its higher heat distortion point of 160°F suits it to such applications as back lighted signs and fixtures, instrument dials, and parts of military and electronic equipment.

Tests show the polyvinyl chloride to withstand 750 to 1000 hours exposure to Florida sunlight before blackening, an advantage claimed over similar materials modified to gain impact resistance at the sacrifice of weather resistance, according to Mr. Knowles.



Machining plastic . . .

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MODEL 49-W Heavy duty, 3½" Solids, 5" Tubing or Light Sections . . . Chop Stroke, 18" Dia. Wheel.

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- Clean, close cuts of ferrous and non-ferrous metals of all kinds, as well as almost any other industrial material, including plastics, glass, ceramics, brick, brake linings, etc.
- The BRIDGEPORT "ABRASAW" cuts ⅝" round cold rolled steel in 1 second; 1" square tool steel in 3 seconds; 2¼" O.D. x 1 13/16" I.D. SAE 1030 tubing in 7 seconds; etc.
- Chop stroke or reciprocating head
- Hand or power operation
- Wet or dry cutting
- Treadle or air operated vise
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- Built-in Coolant System
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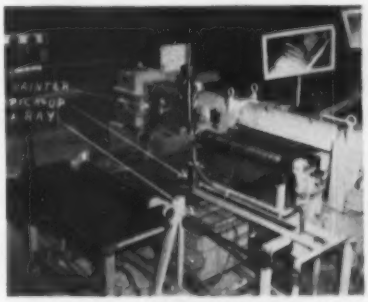
NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 113 or 114

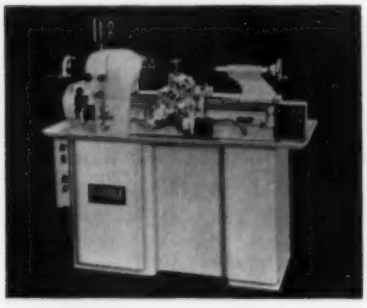
Method devised to gage sheet steel for making tubes



An X-ray thickness gage attached to a sheet metal slitter is used for the gaging of sheet steel used in the manufacture of GM steel tubing. The slitter slices rolls of 36-in. sheet steel into as many as 56 separate strips. Currently at Rochester Products, 15 different thicknesses of metal are being used depending on the wall thickness of the tubing specified. The gage consists of a chasis console, an X-ray source mounted with a pickup. Sliding the source and the pickup back and forth enables any section of the sheet steel to be gaged. The steel is run through the slitter at 600 fpm. *Rochester Products Div., General Motors Co.*

For more data circle No. 42 on postcard, p. 113.

Variable spindle speed, feed control on new lathe



Pushbutton infinite spindle speed control and an independent electric carriage and cross slide are offered together in the new Hardinge Model HLV high speed precision tool room and production lathe. Spindle speeds from 125 to 3000 rpm are selected simply by pressing a button on the control box located over the headstock. Rate of carriage and cross slide feed is controlled independently, permitting exact combination of spindle speed and carriage feed for the material being cut, type of cutting tool used, and the work finish required. Machine does not have to be stopped to change speed or feed. *Hardinge Brothers, Inc.*

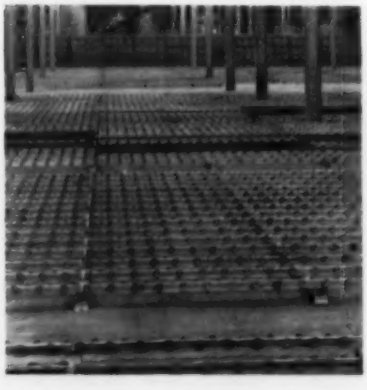
For more data circle No. 43 on postcard, p. 113.

Four unit transfer machine handles housing assemblies

Two 3½ x 24 round bar way units are utilized on a new transfer machine that performs precision boring, chamfering and cross feed facing operations on cylinder blocks and flywheel housing assemblies. Mounted opposite them are two 3 x 12 units for spot facing. The units utilize heavy duty worm gear drives with cross feed facing heads. Each is powered by a 10 hp, dc motor. Cutter foot speed can by maintained uniformly throughout varying diameters of cut. *Baker Brothers, Inc.*

For more data circle No. 44 on postcard, p. 113.

Rolling floor provides first-in, first-out storage



To store a variety of boxed components so that old models are ahead of new—first-in, first-out—and are readily available for quick assembly, a new Westinghouse plant installed a rolling-floor in its warehouse. The live storage area is made up of level conveyor lanes, each lane consisting of three rows of A-F live rail wheel conveyor. Over two miles of live rail were used. Components are stored on convenient-to-handle 10-gage sheet metal pallets, placed in line at the feed-in end of rows by fork trucks. Live rails are mounted on batten ties far enough off the floor to permit forks to slip under pallet. Pallet loads in storage move along lanes in the correct order, first-in, first-out; are moved by fork truck pushing at feed-in end or can easily be pulled by operator. *Alvey-Ferguson Co.*

For more data circle No. 45 on postcard, p. 113.

Turn Page

Folding, box and pan work without changing blades

Dual purpose folding machines can be adjusted quickly from one useful operation to another — ordinary folding and box and pan work without changing blades. They are manufactured in two sizes with a total segmental blade length of 37 and 49 in. respectively. Steel horizontal extension fingers of various widths are fitted to the front edge of the clamping beam. Thumb screws secure them at any point along the beam enabling them to be detached when not required. These fingers will form trays to 3¾ in. deep and various widths by a combination of two or more fingers. For straight folding and bending all fingers remain on the clamping beam, forming a complete blade. *F. J. Edwards Ltd.*

For more data circle No. 46 on postcard, p. 113.

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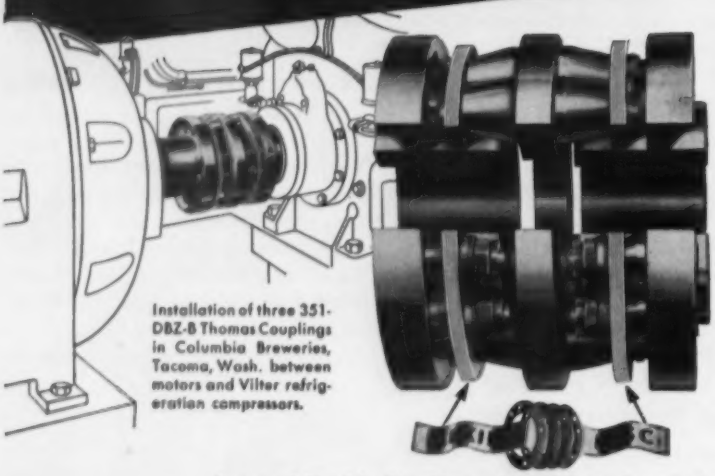
for more years of better service!



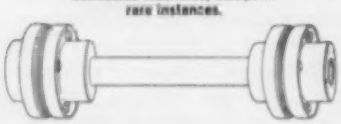
Installation of three 351-DBZ-8 Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



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Strapping seals

Copper-plated seals to lock strapping in place are made from electro-copper-coated cold rolled strip steel with a bright finish to give the users all the qualities of copper with the strength of steel. Seals

are furnished in the same gage as the strapping and, when used with the Allegheny Sealers, are crimped with the Lock-Seal Joint which assures a tight closure, guaranteed not to slip. *Allegheny Steel Band Co.*

For more data circle No. 47 on postcard, p. 113.

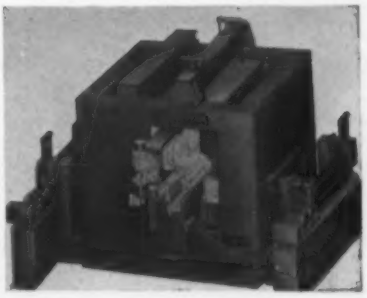
Thread repair kits

For general plant maintenance and fast thread repair, 26 shop-pack kits are now available, each containing a quantity of stainless steel

wire thread inserts, tap and inserting tool in a sturdy metal-edged box. Sizes range from 6-32 to 1½-6 in. both N. F. and N. C. series. *Heli-Coil Corp.*

For more data circle No. 48 on postcard, p. 113.

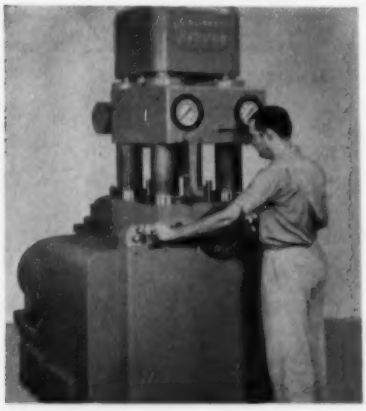
Shear-weld-trimmer joins coil ends in process lines



Joining the ends of coils in continuous process lines such as galvanizing, pickling, annealing, and slitting lines, is accomplished on this model RB shear-weld-trimmer. It incorporates features found essential in joining coil ends from years of steel mill experience. Basic components include entry and exit pinch rolls, entry and exit strip centering devices, transfer carriage with independent clamp jaws, double blade up cut shear and die set, welder-trimmer unit, roller lift, and roller holder-down devices. All these units are contained in a single machine giving complete automation to the joining process. *Morton Mfg. Co.*

For more data circle No. 49 on postcard, p. 113.

Difficult parts made in fewer operations



Cost reductions for manufacturers who must produce a variety of small size, deep drawn and formed parts are possible with the new Cincinnati 8-in. Hydroform. Hydroforming embodies the use of a male punch, and a flexible die member backed up by hydraulic oil pressure which may be accurately controlled up to 15,000 psi. The flexible die member not only eliminates the most costly element of a normal die set, but increases forming efficiency so that difficult parts are made in fewer operations. Parts are formed from sheet metal blanks up to 8-in. diam with a maximum draw of 5 in. Practically all sheet metal gages up to ¼ in. steel can be drawn. Operating rate is 200 cycles per hour. The machine is self-contained; requires only water and electrical connections to be put into operation. Larger Hydroform machines are offered in 12, 19, 23, 26 and 32-in. capacities. *Cincinnati Milling Machine Co.*

For more data circle No. 50 on postcard, p. 113.

Face grinder has work spindle in horizontal plane

Having the work spindle in a horizontal plane on a new face grinding machine permits wide flexibility of workholding devices. The work rotating in a vertical plane results in easy cleaning of the workholding surface, effective coolant application and high surface quality of the work being ground. Grinding with the periphery of the wheel, this machine will efficiently produce accurate, flat surfaces on work up to 10 in. diam and up to 3 in. thick, on a permanent magnet chuck. Accurate concave or convex surfaces up to 10° are as easily ground as flat surfaces. Wheel truing by the set-diamond method is another feature greatly reducing cost. Wheel slide grinding and truing speeds are readily selected and set, with graduated dial indicating rate in use at all times. Accuracy of sizing is attained through the workfeed mechanism. *Brown & Sharpe Mfg. Co.*

For more data circle No. 51 on postcard, p. 113.

Inverted mechanical presses for resistance welding

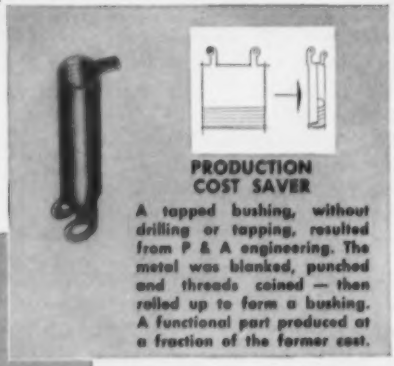
Compact low-tonnage inverted mechanical presses for spot and projection resistance welding operations are made in a line of standard 32, 42 and 60-in. models, each having adjustable strokes of 5, 6 and 8 in. They are rated at about 2 tons capacity. They have large upper and power platen areas that extend their application into other production operations. Maximum operating speed of the presses is 2200 strokes per hr. Both upper and lower platens have accurately spaced tapped holes which permit quick changeover from one electrode and fixture or die arrangement to another for small production operations. The presses feature a simple, compact, self-contained mechanical drive unit called a mechanical knee. This unit is mounted in the base and raises and lowers the lower platen. Stroke of the presses is easily changed by repositioning the cam followers to fixed locations in the scotch mechanism. *Expert Welding Machine Div.*

For more data circle No. 52 on postcard, p. 113.

Turn Page

we specialize in production cost savings

. . . and pass the savings along to you!



PRODUCTION COST SAVER

A tapped bushing, without drilling or tapping, resulted from P & A engineering. The metal was blanked, punched and threads coined — then rolled up to form a bushing. A functional part produced at a fraction of the former cost.

PRODUCTION COST SAVER

This brass shell replaced two components. By redesigning, P & A was able to fabricate the part from a single strip of metal processed on one machine with progressive tools.

PRODUCTION COST SAVER

An original two-piece assembly converted to a one-piece shell. The challenge presented by the fact that the opening had to be at the small end, was solved by reconing and knurling.

Send us your parts or blue prints for analysis. In addition to a full report by our staff engineers, our representatives in key cities are immediately available to offer you consulting service. Our Brochure 54-4 tells more about us. May we send you a copy?

P&A

THE PLUME & ATWOOD MFG. CO.

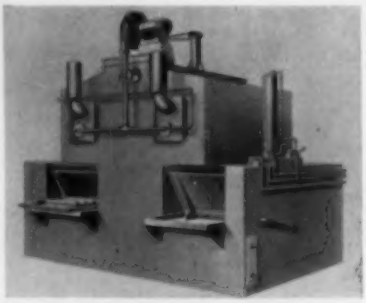
A PANDA PRODUCT

THOMASTON, CONN.

N. Y. Office: 220 Broadway

Heat treat furnace

Bantam-sized batch furnace for controlled atmosphere heat treating is designed for processing parts for small plants and for large ones which have limited or varied production problems. It features design and accessories usually found only on large furnaces. The furnace has capacity to heat 500 lb gross per hr to 1500° F; can be operated at temperatures ranging from 400° to 1800° F. As one batch is completed in the furnace chamber and lowered into the quench oil, simultaneously a previously-loaded tray of cold work moves onto the charge elevator and into the furnace chamber. *Holcroft & Co.*



For more data circle No. 53 on postcard, p. 113.

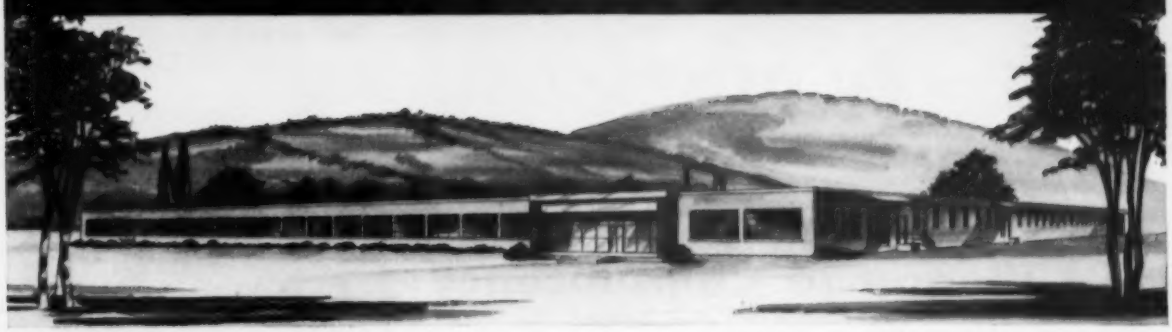
Fluxless soldering

Another model of Sonobond has been released for fluxless soldering of wires, small parts, and the repairing of aluminum castings. The ultrasonic soldering head is 8 in. long and weighs only 10 oz. Although small, it has ample ultrasonic power in its ⅛-in. diam tip to tin aluminum, copper, brass, magnesium or silver very rapidly. The heat required is supplied by a 600 w platen. *Aeroprojects Inc.*

For more data circle No. 54 on postcard, p. 113.

Turn Page

this is our new, modern plant...



here the finest equipment and skilled men are producing metal fabricated parts that set a new standard for quality

To leadership in experience, Plume & Atwood now adds leadership in the newest, most scientifically equipped manufacturing facilities that metal fabrication has known. Here, in Thomaston, Conn., in a plant covering 150,000 square feet, single level operation and high speed production lines will assure attractive delivery schedules on all products, from intricate stampings and assemblies to large, drawn shells.

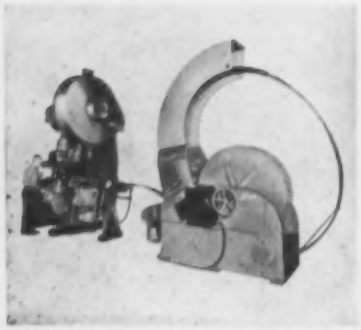
An Invitation . . .

Our plant means a lot to us, for in it we see the realization of our plans to supply your needs for quality products faster than has ever been possible before. We cordially invite you to stop in and see us. Traditional New England hospitality awaits you at our doorstep.

PANCA

THE PLUME & ATWOOD MFG. CO.

Thomaston, Conn.



Coil stock cradle saves press room space

A combination cradle and straightener, with a reverse loop feature, saves valuable floor space in a press room. Coil stock is carried on 2 large diameter, powered rollers, that are mounted in self-aligning ball-bearing pillow blocks. Rotating side plates hold the coil stock in place, and provide perfect and easy alignment with press. Side plates are adjustable to accommodate various coil widths. The built-in straightener will straighten all stock up to 3/16 in. thick. It consists of 2 sets of pinch rolls and 5 straightening rolls. A 4:1 speed drive motor provides a wide range of operating speeds, and flow of coil stock is further controlled by a control arm which starts and stops motor automatically. *Special Equipment & Sales Co.*

For more data circle No. 55 on postcard, p. 113.

AJAX DIHEDRAL COUPLINGS

a Challenge to Complacency

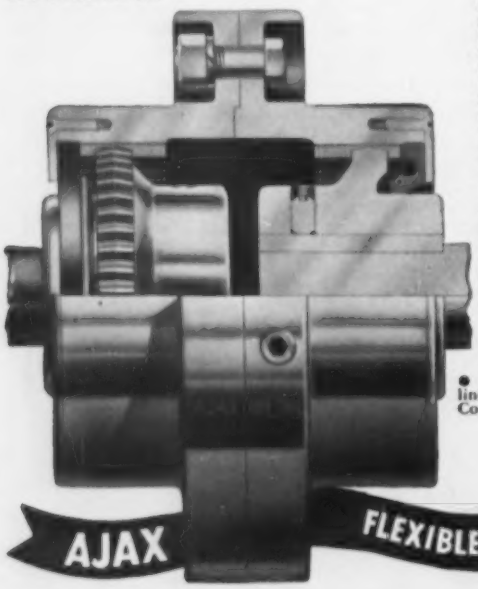
● The AJAX Dihedral Flexible Coupling for direct connected machines is an exclusive and basically new coupling. It overcomes design, manufacturing, assembly and maintenance troubles which have been taken for granted as necessary evils over the years.

ENGINEERS are improving and simplifying design.

PRODUCTION MEN are saving machining and assembly time in the shop and in the field.

USERS are securing amazing results in freedom from costly down time and vastly reduced maintenance costs.

Field-tested for five years, AJAX Dihedral performance is a challenge to complacency. For engineering service or further information about AJAX Dihedral Couplings, consult your telephone directory or write the AJAX factory for Bulletin 52



Ajax Dihedral Performance Facts

1. Handles shaft misalignment,—offset, angular and end float—up to a total of 12 degrees.
2. AJAX design permits holding tooth clearance to lubrication film requirements.
3. More tooth area in contact under misalignment than with any other shape tooth.
4. Load is distributed at center of teeth at point of greatest strength.
5. All teeth hardened to 50-55 Rockwell C to combine hard wear surface with tough core.
6. Seals keep lubricant in and dirt out.
7. Gives Constant peripheral speed.
8. No end-of-tooth contact even under maximum misalignment.
9. Free end float.
10. Standard sizes to fit shafts from 1/2" to 11".

● Also manufacturers of a complete line of AJAX Rubber-Bronze Bushed Couplings and Vibrating Conveyors.

Representatives in Principal Cities

AJAX FLEXIBLE COUPLING CO. INC.

WESTFIELD, N. Y.

Self-propelled lifter

Known as the Walkie-Worklifter, a self-propelled lifter has a lifting capacity of 1000 lb and is designed for light and medium duty service.

It is available in many models including a straddle base type, with a lifting range of 108 in. Standard platform models are made with lifting ranges up to 110 in. *Economy Engineering Co.*

For more data circle No. 56 on postcard, p. 113.

Gold standards

As a service to plants fabricating aluminum according to government specifications or the equivalent, a set of Gold Standards for aluminum spotweld testing has been made available. This set is comprised of resistance standards in thicknesses ranging from 0.025 to 0.075 in. Range of thickness includes important stock sizes employed in aircraft and other industries using light alloy sheet. The standards are used for calibration of surface resistance meters employed as inspection devices for the determination of the state of cleanliness of aluminum prior to spotwelding. *Kelite Products, Inc.*

For more data circle No. 57 on postcard, p. 113.

Tap analyzer

This tap analyzer is an accurate measuring microscope to provide means for holding a tap in a firm position and in a definite relationship to the several calibrated motions of the instrument. Geometric

contours of taps to govern cutting efficiency and accuracy can be suitably measured with tolerance specifications of 0.0001 in. Dimension control and perfect fit are assured *Stocker & Yale, Inc.*

For more data circle No. 58 on postcard, p. 113.

Tool grinder

This No. 3 tangent-arc profile grinder was designed to reduce setup time to an absolute minimum and will accurately and efficiently grind a wide variety of cutters, including convex cutters, full half circle up to 2½ in. radius, 120° arc

up to 4 in. radius; concave cutters 0 to 5-in. radii. Clearances may be ground on straight or spiral teeth at 0° to 90° from cutter axis, up to 5-in. length of cut. Profiles composed of any combination of circular arcs and angles may also be ground. *Union Twist Drill Co.*

For more data circle No. 59 on postcard, p. 113.

STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for less than $40 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. "SELECTING THE PROPER DIE HEAD FOR THE JOB" sent free on request.

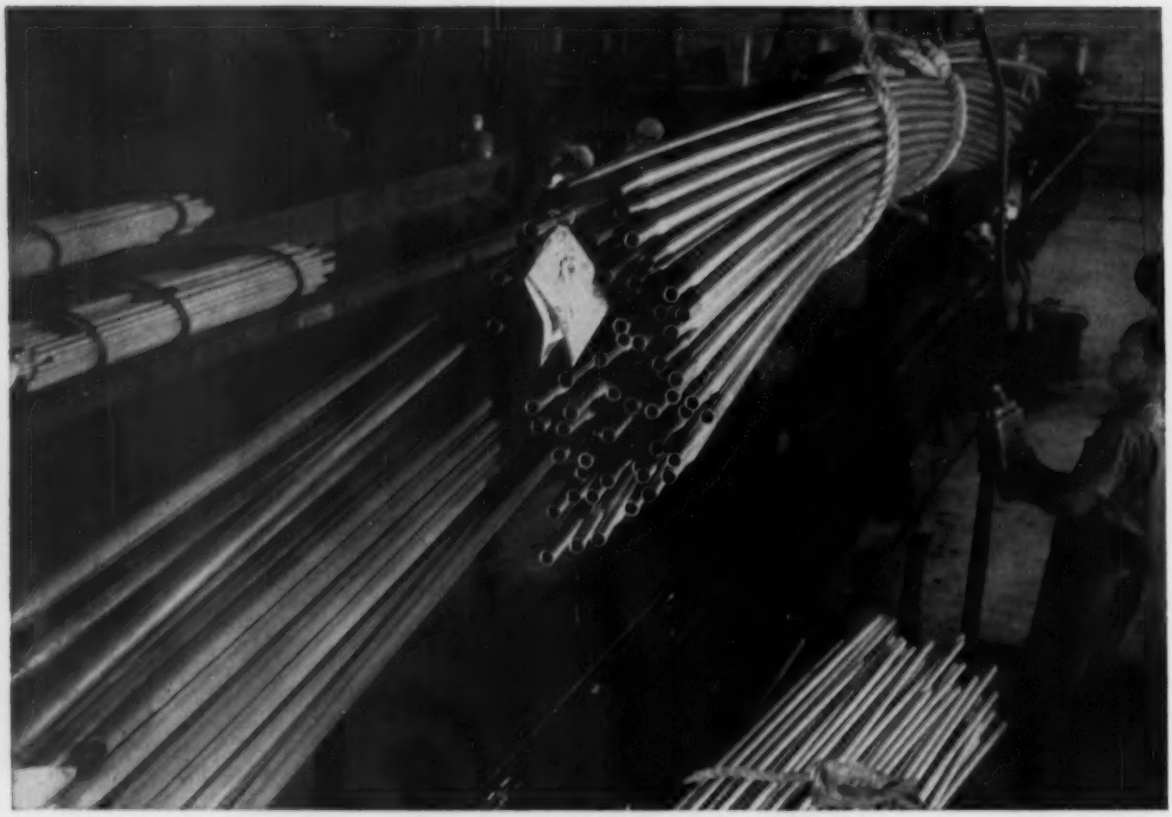
THE EASTERN MACHINE SCREW CORPORATION 21-41 Barclay St., New Haven, Conn.

"...these dies are so tough even you kids can't destroy them. They're made of ATMODIE® air hardening die steel."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS



Good News about Titanium!

SUPERIOR TITANIUM TUBING NOW AVAILABLE IN A WIDE RANGE OF SIZES, FORMS, TEMPERS

The big news about titanium these days is not its high strength to weight ratio; its formability; its corrosion, heat and electrical resistance. Engineers know all this. What they want to know is *when*. The answer is *right now*, as far as tubing is concerned.

Although everything is special as far as the production of titanium tubing is concerned—more grinding operations are required, special lubricants have to be employed, drawing schedules have to be much lighter, annealing must be done in special furnaces, special pickling solutions are demanded—the end result is always a standard tubing obtainable from Superior distributors coast to coast. Sizes range in O.D. from .012" up to 1.50", in wall thickness from .002" to .187", and in lengths up to 24 feet. Tempers—fully annealed, half hard and full hard. Forms—Seamless and Weldrawn®.

Applications are increasing rapidly. They now range from use in the atomic energy programs—to low stress aircraft structural parts—to pneumatic, hydraulic, refrigeration lines—to processing lines in the chemical industry.

Write now for your free copy of Bulletin 43—it contains complete technical and ordering information—and for the name of the Superior distributor nearest you. SUPERIOR TUBE COMPANY, 2004 Germantown Ave., Norristown, Pa. *On the West Coast:* Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif.

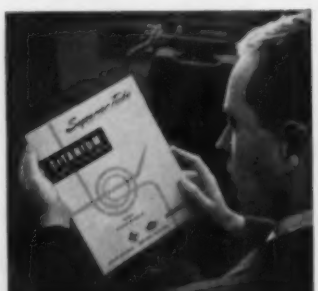
Round and shaped tubing available in Carbon, Alloy and Stainless Steels; Nickel and Nickel Alloys; Beryllium Copper; Titanium; Zirconium

Superior Tube

The big name in small tubing

All analyses .010" to ⅝" O.D. Certain analyses in light walls up to 2½" O.D.

Titanium is reactive, must be heat treated without atmospheric contamination. This vacuum annealing furnace handles material 24 feet in length, operates at temperatures up to 1850°F, is automatically controlled.



All you need to know about titanium tubing is contained in this newly revised 8-page booklet—Bulletin 43. Contains processing information, properties, advantages and end uses, describes sizes, forms and tempers available.

The Iron Age SUMMARY. . .

Broadening industrial demand is pushing steel market toward demand-supply crisis . . . Producers encounter shipping problems.

Demand-supply Crisis . . . General industrial recovery is pushing the 1955 steel market toward a demand-supply crisis. Producers are doing all they can to cope with it. And consumers are fighting hard to protect their own interests.

But signs are multiplying that the surging economy is gaining more strength. The pickup is reaching into new industries and generating additional steel demand which is intensifying competition for available finished products.

The worst is yet to come. More consumers are paying full warehouse price for relatively small tonnages due to delayed mill deliveries. The mills, in turn, are running into shortages of shipping space. Lack of trucks has piled up 6500 tons of finished steel at one mill in the Midwest. Others are experiencing similar difficulty because of the market tightness.

Premium Prices Mounting . . . So-called steel brokers are receiving more inquiries for premium-priced material. Offering prices are mounting toward warehouse level for comparatively large tonnages. So-called secondary material has practically disappeared from the market due to upgrading.

Steel conversion has not reached major proportions as yet. But inquiries to mills for semi-finished are growing, indicating that some sources may be trying to lay the groundwork for domestic conversion arrangements.

The demand pattern has taken on aspects of a chain reaction, with automotive serving as the trigger. Continued high consumer demand for cars indicates a strong automotive push for steel through the first half, barring the possibility of a strike in June.

Wire Shortage Looms . . . Automotive buying in turn is having a strong impact on other consumers, including the car industry's suppliers. Aggravating the picture is a resurgence in buying for farm, appliances, construction, oil and gas, and pipe line projects. Even the railroads are becoming more of a factor.

Significantly, full potential in some industries is yet to come. Construction, farm, pipe line, and railroads, for example. A possible shortage looms in merchant wire due to increasingly heavy demand from farms.

Meanwhile, the outlook for third quarter business is growing stronger. More consumers are trying to place third quarter business. And producers are now resigned to fairly substantial carryovers from second quarter on some products.

Steel Output, Operating Rates

	This Week†	Last Week	Month Ago	Year Ago
Production (Net tons, 000 omitted)	2,279	2,279	2,191	1,624
Ingot Index (1947—49=100)	142.0	142.0	136.4	101.1
Operating Rates				
Chicago	99.0	97.0	91.0	75.5
Pittsburgh	95.0	94.0	90.0	78.0
Philadelphia	95.5	95.5	84.0	61.5
Valley	93.0	93.0*	89.0	52.0
West	95.0	92.5	92.5	66.5
Detroit	90.0	90.0	93.0	83.0
Buffalo	100.0	100.0	100.0	69.5
Cleveland	104.0	98.0*	95.5	57.0
Birmingham	87.5	87.5	86.5	78.0
S. Ohio River	86.0	90.0*	83.5	70.0
Wheeling	96.0	100.0*	98.0	81.0
St. Louis	95.0	87.0*	102.0	52.0
Northeast	95.0*	80.0	87.0	74.5
Aggregate	94.5	94.5*	91.0	68.0

*Revised. †Tentative.

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite prices				
Finished Steel, base	4.797	4.797	4.797	4.634
Pig Iron (Gross ton)	$56.59	$56.59	$56.59	$56.59
Scrap, No. 1 hvy (gross ton)	$37.50	$37.50	$37.00	$24.17
Nonferrous				
Aluminum, ingot	23.20	23.20	23.20	21.50
Copper, electrolytic	33.00	33.00	33.00	29.875
Lead, St. Louis	14.80	14.80	14.80	12.80
Magnesium, ingot	27.75	27.75	27.75	27.75
Nickel, electrolytic	67.67	67.67	67.67	63.08
Tin, Straits, N. Y.	91.125	90.625	90.50	95.00
Zinc, E. St. Louis	11.50	11.50	11.50	9.25

Warehouses Fill Delivery Gap

Mills lag in promised delivery schedules . . . Distributors picking up emergency tonnage demand . . . Hot, cold-rolled sheets, bars head priority list.

♦ WAREHOUSES are beginning to benefit from inability of mills to maintain promised delivery schedules. Some consumers have been forced to buy emergency tonnages from distributors to help them over the hump.

Products affected are hot and cold-rolled sheets and hot-rolled bars. Auto suppliers are among the casualties.

Despite this, the warehouses claim their business is improving only moderately in relation to strong demand for steel. But it looks like the booming market is finally catching up with the warehouses, who in turn are applying pressure to the mills for their own requirements.

Consumers are talking third quarter about more and more products. The mills are listening, but are cautious about even tentative bookings except for their long-time customers. Reports from IRON AGE districts mention third quarter for hot and cold-rolled sheets, plates, galvanized, some structurals, oil country goods, and electricweld line pipe.

As in earlier tight markets, the bugaboo of carryovers from one quarter to the next will complicate the problems of both supplier and consumer. For instance, a carryover on cold-rolled sheets from second quarter to third is considered a certainty, barring a strike in automotive.

Some sources fear a shortage of merchant wire may develop at the jobber level unless stocks are built up considerably. April is the month that consumers are particularly worried about.

SHEET AND STRIP . . . Hot and cold rolled sheet demand has reached the frantic stage. Some consumers have been hit by delayed mill deliveries, have bought tonnages from warehouses in a pinch. There's nothing but strength in this market, and third quarter potential is considered as good as first two quarters. Mills will have carryover of cold rolled into third quarter. Strip demand still strong.

GALVANIZED . . . Those mills accepting third quarter business are doing so only for their old established customers.

BARS . . . Mills are having a tough time maintaining delivery promises on hot-rolled bars. It looks as though March will be a record production month as predicted earlier by IRON AGE. In **Chicago**, inquiry pace is quickening, indicating that demand is on a broader base which would cushion effect of an automotive letdown. Alloy bars also strong. Cold-finished bars are making a strong comeback, trade sources indicate.

PLATES . . . Plate deliveries have moved out to June in some centers. In one district, producers are trying to ease the pressure by setting back deliveries. The strong plate market reflects heavy demand for electricweld line pipe, both in volume and in nature of the upturn. Oil and gas pipeline builders had placed tentative orders with the mills in January and February for later delivery. These orders are now hitting rolling mills as various projects clear government and financial hurdles. There's also some railroad business, indicating the rails are launching seasonal track replacement which means more rail bolt plate.

TIN PLATE . . . Continued strong demand for this product has added to the competitive angle within mills. Pressure is on cold sheet facilities.

WIRE . . .Emphasis on wire has shifted to merchant and construction products. In **Chicago**, a shortage of merchant lines is expected by April if building rate continues. In **Pittsburgh**, manufacturers wire is still running strong, but the greatest demand is for merchant and construction. In **Cleveland** and **Detroit**, demand from automotive sources for spring wire continues to lead the parade. Furniture making is also a factor.

STRUCTURALS . . . Wide-flange and light structurals are now on a par with sheets and bars with even standards coming up in recent days. In **Chicago**, some orders are even being placed as far ahead as July, with consumers apparently wanting to avoid a similar previous experience to what happened with plates. In **Pittsburgh**, some activity among freight car builders has contributed to market strength. Most comes from road building program, steady construction rates.

PIPE AND TUBING . . . Continued demand for oil country products is the biggest factor in this very strong market. Irrigation projects in the West are also pushing capacity production on most products. Cast iron pipe demand grows with increased metropolitan expansion. Producers are solid through first half on seamless oil country and welded line pipe.

GENERAL . . . Kaiser Steel Corp. cut its price on low carbon cold-rolled strip from 7.65 to 7.50. Price change is effective March 17.

Wheeling steel planned an increase from 25 to 30 turns per week on its electrolytic tin plate lines at its **Yorkville, O.** works.

Kennametal Inc. announced a price increase of 10 pct, effective March 21, on all cemented carbide blanks and standard carbide tools used in the metalworking industry.

Purchasing Agent's Checklist

STEEL: 1955 modernization, expansion will hit $800 million . . . p. 51

PIPE: Electric weld, cast iron pipe gets boost in Southwest . . . p. 55

RAILROADS: Freight car ordering hitting a spurt with January a top month . . . p. 56

STRUCTURALS: Second half upswing seen with highway, industry, commerce factors . . . p. 59

TRUCKS: New, high-styling in GMC series with light weight Diesel featured . . . p. 68

Comparison of Prices

(Effective Mar. 22, 1955)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Mar. 22 1955	Mar. 15 1955	Feb. 22 1955	Mar. 23 1954
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.05¢	4.05¢	4.05¢	3.925¢
Cold-rolled sheets	4.95	4.95	4.95	4.775
Galvanized sheets (10 ga.)	5.45	5.45	5.45	5.275
Hot-rolled strip	4.05	4.05	4.05	3.925
Cold-rolled strip	5.79	5.79	5.79	5.513
Plate	4.225	4.225	4.225	4.10
Plates wrought iron	9.30	9.30	9.30	9.30
Stain'l's C-R strip (No. 302)	41.50	41.50	41.50	41.50
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$8.95
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.65
Special coated mfg. ternes	7.85	7.85	7.85	7.75
Bars and Shapes: (per pound)				
Merchant bars	4.30¢	4.30¢	4.30¢	4.16¢
Cold-finished bars	5.40	5.40	5.40	5.20
Alloy bars	5.075	5.075	5.075	4.875
Structural shapes	4.25	4.25	4.25	4.10
Stainless bars (No. 302)	35.50	35.50	35.50	35.50
Wrought iron bars	10.40	10.40	10.40	10.40
Wire: (per pound)				
Bright wire	5.75¢	5.75¢	5.75¢	5.525¢
Rails (per 100 lb.)				
Heavy rails	$4.45	$4.45	$4.45	$4.325
Light rails	5.35	5.35	5.35	5.20
Semifinished Steel: (per net ton)				
Rerolling billets	$64.00	$64.00	$64.00	$62.00
Slabs, rerolling	64.00	64.00	64.00	62.00
Forging billets	78.00	78.00	78.00	75.50
Alloy blooms, billets, slabs	86.00	86.00	86.00	82.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.675¢	4.675¢	4.675¢	4.525¢
Skelp	3.90	3.90	3.90	3.75
Finished Steel Composite: (per pound)				
Base price	4.797¢	4.797¢	4.797¢	4.634¢

	Mar. 22 1955	Mar. 15 1955	Feb. 22 1955	Mar. 23 1954
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$61.19	$61.19	$61.19	$61.19
Foundry, Valley	56.50	56.50	56.50	56.50
Foundry, Southern, Cin'ti	60.43	60.43	60.43	60.43
Foundry, Birmingham	52.88	52.88	52.88	52.88
Foundry, Chicago	56.50	56.50	56.50	56.50
Basic, del'd Philadelphia	60.27	60.27	60.27	60.27
Basic, Valley furnace	56.00	56.00	56.00	56.00
Malleable, Chicago	56.50	56.50	56.50	56.50
Malleable, Valley	56.50	56.50	56.50	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	10.00¢
‡ 74-76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig iron	$56.59	$56.59	$56.59	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$38.50	$38.50	$38.50	$25.50
No. 1 steel, Phila. area	38.50	38.50	39.00	22.00
No. 1 steel, Chicago	35.50	35.50	35.50	25.00
No. 1 bundles, Detroit	29.00	29.00	29.00	16.50
Low phos., Youngstown	37.50	37.50	36.50	27.50
No. 1 mach'y cast, Pittsburgh	43.50	43.50	43.50	41.50
No. 1 mach'y cast, Philadel'a	44.50	44.50	43.50	38.50
No. 1 mach'y cast, Chicago	46.50	46.50	45.00	36.50
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$37.50	$37.50	$37.00	$24.17
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.38	$14.38	$14.38	$14.38
Foundry coke, prompt	16.75	16.75	16.75	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	29.876‡
Copper, Lake, Conn.	33.00	33.00	33.00	30.00
Tin, Straits, New York	91.125†	90.625	90.50	96.00
Zinc, East St. Louis	11.50	11.50	11.50	9.25
Lead, St. Louis	14.80	14.80	14.80	12.80
Aluminum, virgin ingot	23.20	23.20	23.20	21.50
Nickel, electrolytic	67.67	67.67	67.67	63.06
Magnesium, ingot	27.75	27.75	27.75	27.75
Antimony, Laredo, Tex.	28.50	28.50	28.50	28.50
† Tentative. ‡ Average. * Revised.				

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 144→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem, Pa. B3	$58.00	$58.50	$59.00	$59.50	.....
Birmingham R3	52.38	52.88	.....	.....	.....
Birmingham W9	52.38	52.88	.....	.....	.....
Birmingham U4	52.38	52.88	$56.50	.....	.....
Buffalo R3	56.00	56.50	57.00	.....	.....
Buffalo I1	56.00	56.50	57.00	.....	.....
Buffalo W6	56.00	56.50	57.00	.....	.....
Chicago I4	56.00	56.50	56.50	57.00	.....
Cleveland A5	56.00	56.50	56.50	57.00	61.00
Cleveland R3	56.00	56.50	56.50	.....	.....
Daingerfield L3	52.50	52.50	52.50	.....	.....
Duluth I4	56.00	56.50	56.50	57.00	.....
Erie I4	56.00	56.50	56.50	57.00	.....
Everett M6	.....	61.00	61.50	.....	.....
Fontana K1	62.00	62.50	.....	.....	.....
Geneva, Utah C7	56.00	56.50	.....	.....	.....
Granite City G2	57.90	58.40	58.90	.....	.....
Hubbard Y1	.....	.....	56.50	.....	.....
Minnequa C6	56.00	59.00	59.00	.....	.....
Monessen P6	56.00	.....	.....	.....	.....
Neville Isl. P4	56.00	56.50	56.50	.....	.....
N. Tonawanda T1	.....	56.50	57.00	.....	.....
Pittsburgh U1	56.00	.....	.....	57.00	.....
Sharpsville S3	56.00	56.50	56.50	57.00	.....
So. Chicago R3	56.00	.....	56.50	.....	.....
Steelton B3	58.00	58.50	59.00	59.50	64.00
Swedeland A2	58.00	58.50	59.00	59.50	.....
Toledo I4	56.00	56.50	56.50	57.00	.....
Troy, N. Y. R3	58.00	58.50	59.00	59.50	64.00
Youngstown Y1	.....	.....	56.50	57.00	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. Subtract 38¢ per ton for phosphorus content 0.70 and over.

Silvery Iron: Buffalo, 1%, $66.25; Jackson, 1%, Gl, $65.00. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add $1 per ton for 0.75 pct or more phosphorus. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	301	302	303	304	316	321	347 Cb	410	416	430
Ingots, rerolling	16.75	17.75	19.25	19.00	29.75	23.50	25.50	14.00	—	14.25
Slabs, billets, rerolling	21.00	23.25	25.25	24.50	38.00	30.25	46.75	18.25	—	18.5
Forg. discs, die blocks, rings	39.00	39.00	42.00	41.25	61.75	46.25	—	31.00	31.75	31.7
Billets, forging	30.00	30.25	32.75	31.75	48.25	36.00	54.75	24.00	24.50	24.5
Bars, wires, structurals	35.75	36.00	38.75	38.00	57.25	42.75	64.25	28.75	29.25	29.2
Plates	37.75	38.00	40.25	40.50	60.50	46.50	69.25	30.00	30.50	30.5
Sheets	41.75	42.00	49.25	44.50	64.50	51.25	77.50	34.25	41.25	34.7
Strip, hot-rolled	30.25	32.50	37.25	35.00	55.00	41.75	63.00	26.25	—	27.0
Strip, cold-rolled	38.75	42.00	46.00	44.50	64.50-64.75	51.25-51.50	77.50	34.25	41.25	34.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4* Philadelphia, *D5.*

Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (.25¢ per lb higher) *W1* (.25¢ per lb higher); New Bedford, Mass., *R6.*

Bar: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U3;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5;* Ft. Wayne, *I4;* Philadelphia, *D5.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*

Plates: Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Philadelphia, *D5.*

Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*

Forgings billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1* Syracuse, *C11.*

Await U. S. Export Rulings

Eastern market steady as word on new curbs is due this week . . . Pressure on Chicago price mounts with continued strong buying . . . Composite holds at $37.50.

◆ BIG factor in the market this week was the pending Commerce Dept. action on scrap exports. Limited activity in the East indicated exporters and domestic buyers are standing by to see what the rules will be. Best guess is that some type of quota system will be established but no complete ban.

Chicago continued to show good buying strength although most grades resisted pressure for price increases and advances were confined to electric furnace grades.

A major tonnage of industrial bundles being laid down at Detroit docks for export to Canada has disrupted the normal flow to other markets, principally to Cleveland. This factor puts more import than usual on automotive lists, closing this week at record tonnages.

Uncertainty on export rulings continued to hamper market activity but the basic demand remains solid and THE IRON AGE Heavy Melting Steel Scrap Composite held firm at $37.50.

Pittsburgh . . . Brokers are having difficulty filling latest order for No. 1 steel at $39. Competition from consumers in other areas has reduced tonnages available for delivery to mill on basis of "out-of-district" price set by an independent steel producer. None-the-less, a large consumer is still receiving tonnages on an old, lower-priced order. Openhearth prices held unchanged. Blast furnace grades held firm.

Chicago . . . While mill prices continued to withstand advances in most grades, the market at Chicago continued very strong with electric furnace grades again advancing and broker buying of steel grades continuing to advance in price despite small purchases by mills at the bottom of the spread. Dealer No. 1 heavy melting was holding at $35 as the week opened with No. 2 dealer bundles moving from the dealer at $25 and No. 1 dealer bundles moving at $35. While it is still contended that mills here are more than adequately stocked with scrap, attempts to buy at lower prices have produced negligible tonnages of scrap, and Eastern markets continue to drain supply sources normally feeding the Chicago district. With increasing purchases expected in the next 10 days to 2 weeks, a further tightening is expected.

Philadelphia . . . Market is still marking time with respect to possible qualitative export restrictions from Commerce Dept. on future overseas scrap shipments. No restrictive effect will be felt at least for month of April and probably May. All export committments for April have been filled. One large district producer is out of the market. In general, mills are showing a lack of interest. Dealers report there is "fair to slow" intake into yards.

New York . . . Little activity reported as brokers are standing by pending announcement of new export regulations. Speculation on extent of export curbs continues and while some tightening appears likely, exporters are hopeful that there will be no full stoppage.

Detroit . . . There have been no sizeable purchases of scrap reported here during the last week. Both brokers and dealers seem to be waiting for the new automotive lists which will be out sometime next week. Rumors persist that negotiations are going on for a Canadian purchase of between 100,000 and 150,000 tons of industrial. The scrap is to be shipped by water over a period of 3 or 4 months. Although dealers discount effect on the market, the price of industrial scrap would undoubtedly be affected.

Cleveland . . . One Valley marketing area mill bought substantial tonnage of No. 1 heavy melting at prevailing top price of $38 for only major activity in district last week. Mills are expending every effort to hold prices in check by using high percentage of hot metal, increased ore in open hearths and shipments from selected yards.

Heavy attention also going to export developments in Washington. Some industrial tonnage normally moved to Cleveland from Detroit being held there, presumably on speculation for export.

Birmingham . . . The steel scrap market continues strong, both for mills and export. One Southern mill was reported using a $2 springboard. Mills continue to spurn No. 2 bundles but a sale was reported at $1 off. The export market is exceptionally strong and active, according to brokers.

St. Louis . . . Railroad lists closing during the week at St. Louis brought an increase of $1 per ton on No. 1 RR hvy melting and $3 per ton on cast iron brake shoes and a 50¢ per ton advance on some other items. Cast iron borings are sharply up $2.50 per ton on buying by a local factory. The supply of material continues steady.

Cincinnati . . . Newport Steel Co., which recently bought scrap, now unable to take shipment or ship out finished steel due to week-long strike of Louisville and Nashville Railroad. Coming on heels of flood which shut down three openhearths, truck and barge facilities being pushed wherever possible. Mill now gets about one or two switches weekly from supervisory personnel compared to normal of several daily. If strike continues another week cutbacks probable.

Buffalo . . . Steady, marking-time tendencies prevail in scrap market here. Dealers report no difficulty finding supplies to cover old orders at present prices.

Boston . . . All outside mills have stopped buying No. 1 heavy melting and No. 1 bundles. Worcester, Mass., and Phillipsdale, R. I., are still buying a little of the best steel grades.

West Coast . . . Prices firmed up in Los Angeles and are holding steady in San Francisco and Seattle. Mill buyers and dealers feel they'll stay at present levels for a while.

"WHY...why does it cost us so much to make this?"

How many times have you asked this question? A simple part, an assembly or a finished product—why should it cost so much to make? Why? Maybe one answer is so obvious it's being overlooked.

This may be an answer

Invisible cracks developing in parts during manufacture are too often the cause of these high costs. It isn't the cost of the rough parts themselves. It's the time and labor that go into them . . . setting up, machining, finishing . . . all to be scrapped at final inspection.

You don't have to accept this loss as "fixed." Inspection with Magnaflux during manufacture finds *all* cracks when they first occur — suggests the cause and how it can be corrected — *before* parts are run in quantity. Before the bad ones raise your product costs to the point where you ask "Why?"

Ask to have one of our engineers show you how inspection with Magnaflux can save you money — or write for new booklet on LOWER MANUFACTURING COST.

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Scrap Prices *(Effective Mar. 22, 1955)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	31.00 to 32.00
Machine shop turn.	22.00 to 23.00
Mixed bor. and ms. turns.	22.00 to 23.00
Shoveling turnings	26.00 to 27.00
Cast iron borings	26.00 to 27.00
Low phos. punch'gs, plate	41.00 to 42.00
Heavy turnings	35.00 to 36.00
No. 1 RR. hvy. melting	40.50 to 41.50
Scrap rails, random lgth.	46.00 to 47.00
Rails 2 ft and under	51.00 to 52.00
RR. steel wheels	45.00 to 46.00
RR. spring steel	45.00 to 46.00
RR. couplers and knuckles	45.00 to 46.00
No. 1 machinery cast.	43.00 to 44.00
Cupola cast	39.00 to 40.00
Heavy breakable cast.	34.00 to 35.00

Chicago

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 factory bundles	36.00 to 37.00
No. 1 dealers' bundles	35.00 to 36.00
No. 2 dealers' bundles	24.00 to 25.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and turn.	19.00 to 20.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. forge crops	40.00 to 41.00
Low phos. punch'gs, plate	38.00 to 39.00
Low phos. 3 ft and under	37.00 to 38.00
No. 1 RR. hvy. melting	38.00 to 39.00
Scrap rails, random lgth.	40.00 to 41.00
Rerolling rails	50.00 to 51.00
Rails 2 ft and under	48.00 to 50.00
Locomotive tires, cut	37.00 to 38.00
Cut boilers & side frames	38.00 to 39.00
Angles and splice bars	44.00 to 45.00
RR. steel car axles	43.00 to 44.00
RR. couplers and knuckles	40.00 to 41.00
No. 1 machinery cast.	46.00 to 47.00
Cupola cast	41.00 to 42.00
Heavy breakable cast.	34.00 to 36.00
Cast iron brake shoes	35.00 to 36.00
Cast iron car wheels	37.00 to 38.00
Malleable	45.00 to 46.00
Stove plate	36.00 to 37.00

Philadelphia Area

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	30.00 to 31.00
Machine shop turn.	21.50 to 22.50
Mixed bor. short turn.	21.50 to 22.50
Cast iron borings	20.50 to 21.50
Shoveling turnings	23.50 to 25.00
Clean cast chem. borings	28.00 to 29.00
Low phos. 5 ft and under	41.50 to 42.50
Low phos. 2 ft and under	43.00 to 44.00
Low phos. punch'gs	43.00 to 44.00
Elec. furnace bundles	40.00 to 41.00
Heavy turnings	35.00 to 36.00
RR. steel wheels	41.50 to 42.50
RR. spring steel	41.50 to 42.50
Rails 18 in. and under	51.00 to 52.00
Cupola cast	36.00 to 38.00
Heavy breakable cast.	38.00 to 39.00
Cast iron car wheels	44.00 to 45.00
Malleable	44.00 to 45.00
Unstripped motor blocks	27.00 to 28.00
No. 1 machinery cast.	44.00 to 45.00
Charging box cast.	37.00 to 38.00

Cleveland

No. 1 hvy. melting	$34.00 to $36.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 bundles	34.00 to 36.00
No. 2 bundles	29.00 to 30.00
No. 1 busheling	34.00 to 36.00
Machine shop turn.	18.00 to 19.00
Mixed bor. and turn.	23.00 to 25.00
Shoveling turnings	23.00 to 25.00
Cast iron borings	23.00 to 25.00
Cut struct'r'l & plates, 2 ft & under	42.00 to 43.00
Drop forge flashings	34.00 to 36.00
Low phos. punch'gs, plate	34.00 to 36.00
Foundry steel, 2 ft & under	40.50 to 41.50
No. 1 RR. heavy melting	36.00 to 37.00
Rails 2 ft and under	49.00 to 50.00
Rails 18 in. and under	50.00 to 51.00
Railroad grate bars	37.00 to 38.00
Steel axle turnings	37.00 to 38.00
Railroad cast.	45.00 to 46.00
No. 1 machinery cast.	45.00 to 46.00
Stove plate	42.00 to 43.00
Malleable	44.00 to 45.00

Youngstown

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	37.00 to 38.00
No. 2 bundles	28.00 to 29.00
Machine shop turn.	20.00 to 21.00
Shoveling turnings	26.00
Cast iron borings	26.00
Low phos. plate	37.00 to 38.00

Buffalo

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 busheling	32.00 to 33.00
No. 1 bundles	32.00 to 33.00
No. 2 bundles	27.00 to 28.00
Machine shop turn.	20.50 to 21.50
Mixed bor. and turn.	22.00 to 23.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	22.00 to 23.00
Low phos. plate	35.00 to 36.00
Scrap rails, random lgth.	35.00 to 36.00
Rails 2 ft and under	42.00 to 43.00
RR. steel wheels	36.00 to 37.00
RR. spring steel	36.00 to 37.00
RR. couplers and knuckles	36.00 to 37.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	37.00 to 38.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$28.50 to $29.50
No. 2 hvy. melting	23.00 to 24.00
No. 1 bundles, openhearth	28.50 to 29.50
No. 2 bundles	21.00 to 22.00
New busheling	27.00 to 28.00
Drop forge flashings	27.00 to 28.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	15.50 to 16.50
Shoveling turnings	16.50 to 17.50
Cast iron borings	16.50 to 17.50
Low phos. punch'gs, plate	28.50 to 29.50
No. 1 cupola cast.	34.00 to 36.00
Heavy breakable cast.	25.00 to 27.00
Stove plate	30.00 to 32.00
Automotive cast.	38.00 to 40.00

St. Louis

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 bundles	30.00 to 31.00
No. 2 bundles	24.50 to 25.50
Machine shop turn.	15.50 to 16.50
Cast. iron borings	18.00 to 19.00
Shoveling turnings	17.00 to 18.00
No. 1 RR. hvy. melting	35.00 to 36.00
Rails, random lengths	40.50 to 41.50
Rails, 18 in. and under	47.50 to 48.50
Locomotive, tires uncut	36.00 to 37.00
Angles and splice bars	36.00 to 37.00
Std. steel car axles	35.50 to 36.50
RR. spring steel	37.00 to 38.00
Cupola cast.	42.00 to 43.00
Hvy. breakable cast.	33.00 to 34.00
Cast iron brake shoes	32.00 to 33.00
Stove plate	34.00 to 35.00
Cast iron car wheels	35.00 to 36.00
Malleable	35.00 to 36.00
Unstripped motor blocks	32.50 to 33.50

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 bundles	30.00 to 31.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	28.00 to 28.50
Elec. furnace, 3 ft & under	32.00 to 33.00
Machine shop turn.	12.00 to 12.50
Mixed bor. and short turn.	14.00 to 14.50
Shoveling turnings	14.50 to 15.00
Clean cast chem. borings	18.00 to 19.00
No. 1 machinery cast.	31.00 to 32.00
Mixed cupola cast.	29.00 to 30.00
Heavy breakable cast.	27.00 to 28.00
Stove plate	27.00 to 28.00
Unstripped motor blocks	17.00 to 18.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	30.00
No. 2 bundles	$25.50 to 26.50
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	14.00 to 15.00
Clean cast chem. borings	22.00 to 23.00
No. 1 machinery cast.	37.00 to 39.00
Mixed yard cast.	31.00 to 32.00
Charging box cast.	30.00 to 31.00
Heavy breakable cast.	30.00 to 31.00
Unstripped motor blocks	22.00 to 23.00

Birmingham

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	32.00 to 33.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	32.00 to 33.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	17.00 to 18.00
Electric furnace bundles	32.00 to 33.00
Bar crops and plate	36.00 to 37.00
Structural and plate, 2 ft.	36.00 to 37.00
No. 1 RR. hvy. melting	36.00 to 37.00
Scrap rails, random lgth.	39.00 to 40.00
Rails, 18 in. and under	43.50 to 44.50
Angles & splice bars	40.00 to 41.00
Rerolling rails	43.00 to 44.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	42.00 to 43.00
Charging box cast.	22.00 to 23.00
Cast iron car wheels	33.00 to 34.00
Unstripped motor blocks	35.50 to 36.50
Mashed tin cans	15.00 to 16.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 bundles	33.00 to 34.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	19.00 to 20.00
Mixed bor. and turn.	20.00 to 21.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	20.00 to 21.00
Low phos., 18 in. & under	37.00 to 38.00
Rails, random lengths	41.00 to 42.00
Rails, 18 in. and under	47.00 to 48.00
No. 1 cupola cast.	39.00 to 40.00
Hvy. breakable cast.	34.00 to 35.00
Drop broken cast.	44.00 to 45.00

San Francisco

No. 1 hvy. melting	$27.00
No. 2 hvy. melting	25.00
No. 1 bundles	26.00
No. 2 bundles	22.00
No. 3 bundles	18.00
Machine shop turn.	8.00
Cast iron borings	9.00
No. 1 RR. hvy. melting	27.00
No. 1 cupola cast.	40.00

Los Angeles

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	28.00
No. 1 bundles	29.00
No. 2 bundles	23.00
No. 3 bundles	20.00
Machine shop turn.	8.00
Shoveling turnings	10.00
Cast iron borings	10.00
Elec. furn. 1 ft. and under	30.00
No. 1 RR. hvy. melting	30.00
No. 1 cupola cast.	$41.00 to 42.00

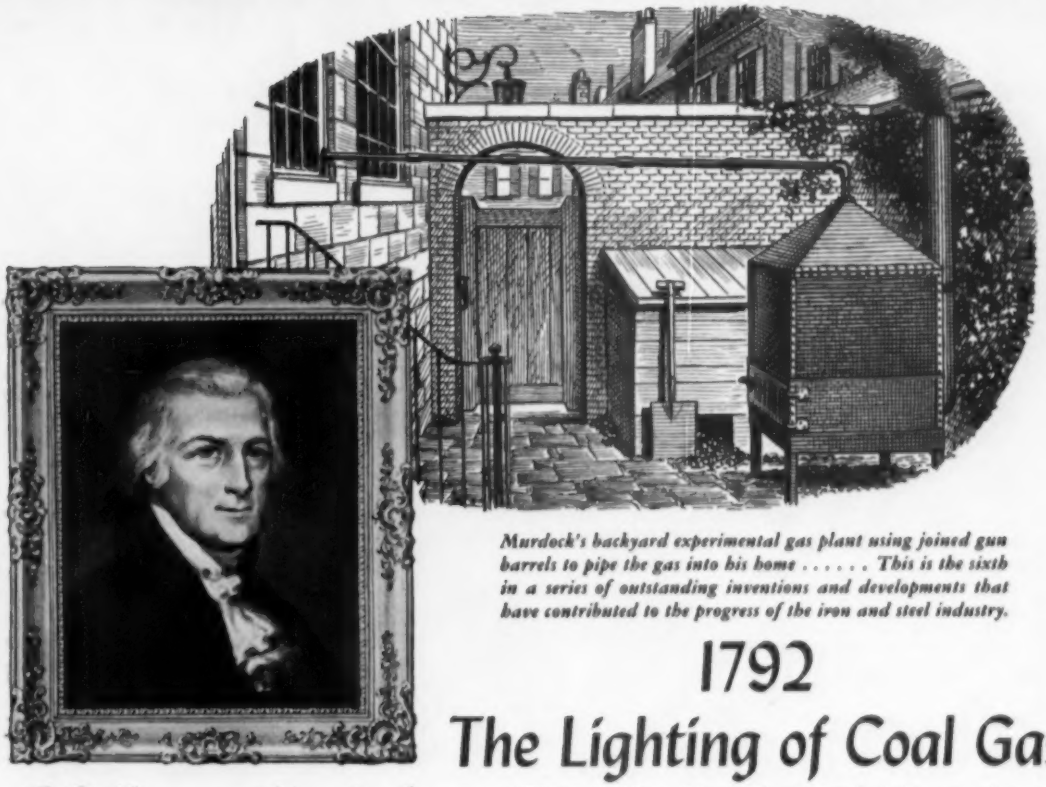
Seattle

No. 1 hvy. melting	$31.00
No. 2 hvy. melting	27.00
No. 1 bundles	23.00
No. 2 bundles	20.00
No. 3 bundles	16.00
No. 1 cupola cast.	35.00
Mixed yard cast.	35.00

Hamilton, Ont.

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 bundles	32.00
No. 2 bundles	26.00
Mixed steel scrap	26.00
Bushelings	27.00
Bush., new fact prep'd	30.00
Bush., new fact unprep'd	26.00
Short steel turnings	$16.00 to 17.00
Mixed bor. and turn.	16.00 to 17.00
Rails, rerolling	41.00
Cast scrap	$42.00 to 45.00

GREAT MOMENTS IN THE HISTORY OF IRON AND STEEL MAKING



Murdock's backyard experimental gas plant using joined gun barrels to pipe the gas into his home . . . . . This is the sixth in a series of outstanding inventions and developments that have contributed to the progress of the iron and steel industry.

William Murdock

1792

The Lighting of Coal Gas

When William Murdock succeeded in pumping gas from an iron retort through a series of gun barrels, he paraphrased "oil for the lamps of China" to "gas for the streets of London."

Murdock's feat of threading together the ends of gun barrels into a continuous pipeline resulted in the flow of illuminating gas for lighting the gloomy streets of London. His system proved so popular it stimulated an immediate demand for cheaper and faster ways for producing iron tubes.

Through the years, piping systems to meet modern industrial needs for plumbing, heating, transportation and structural purposes improved at a rapid rate. Today, the demand for pipe requires approximately 10 to 12 percent of total steel production.

These special steels require special scrap of known analysis, a problem particularly suited to our experience, personnel, equipment and the strategic locations of our offices. Possibly our facilities may help you solve a problem in iron or steel scrap.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

More Pressure on Copper Prices

Jump of copper price in London market to 45¢ per lb adds pressure for price rise . . . Chile may force U. S. price up to 36¢ per lb . . . Copper stocks dip again.

• INCREASE in the price of copper seemed imminent late last week after the red metal jumped to a 45¢-per-lb level on the London Metal Exchange. One trade source commenting on the prospect of a copper price hike said it was now more a question "when" rather than "if" the price will rise.

Boost in copper in London had no immediate effect on the domestic market, but it undoubtedly added strength to the forces which have been pressing for a copper price increase. It further aggravated the impossible copper price situation and dramatized the scarcity of this metal.

As of late last week the U. S. copper price was 12¢ per lb below the London price, and the copper shortage here was regarded as even more severe than it was earlier this year when the price was still at a 30¢ per lb level.

Copper consumers were further upset by reports that Chile has sold fire-refined copper for August delivery at 40¢ per lb. It was regarded as a certainty that if Chile threatens to cut off sales to U. S. consumers unless a higher price is paid, the domestic price would undoubtedly go up again. But even a price advance of a few cents per lb would not have too much effect in easing the domestic shortage so long as copper buyers in England and Europe are willing to come into the market at the current fantastically high levels.

COPPER . . . Copper buyers were extremely perturbed over the way the London market was rising last week and were wondering how long it will be before the Bank of Chile forces the U. S. price up to 36¢ per lb as it rumored they will do.

U S. producers were alloting scarce copper to regular customers at 33¢ per lb late last week. Allotments were being made on the basis customers' historical purchases.

Copper Institute reports that primary and secondary copper production in February totaled 99,461 tons compared with 95,810 tons in January. The production increase is even greater than it seems since February was a 28-day month.

Deliveries of refined copper to fabricators slipped in February to 108,503 tons from January's 113,949. On a daily basis, however, February shipments were higher.

Producer's stocks of refined copper declined for the third straight month and are now estimated at 44,579 tons. A year ago at this time producers had 118,720 tons on hand.

ALUMINUM . . . Government late last week was still foot dragging on plans to help ease the aluminum shortage. Action had been expected by Office of Defense Mobilization last week but it was not forthcoming, despite the prodding of trade associations.

American Die Casters wired ODM that inventories of its members had reached the "critical" stage and that immediate action was needed. And the Nonferrous Founders Society demanded that the government defer stockpiling aluminum for a while and requested an investigation of the export problem.

It won't be of any immediate help, but for the future the aluminum supply situations will be eased by Aluminum Ltd.'s planned doubling of capacity at its Kittimat, B. C., smelter. Company last week said it would spend $190 million to raise Kittimat's capacity to more than 331,500 tons. Present capacity of the smelter is 91,500 tons with 60,000 tons more now under construction. By the end of 1956, Aluminum Ltd. expects to be able to turn out 181,500 tons with the other 149,500 due to be available in 1959.

Primary aluminum production in February was down almost 12,000 tons from all-time record January output of 128,703 tons, Aluminum Assn. reports.

February production amounted to 116,235 tons. This, however, was still above the February '54 output total of 110,483 tons.

Total output for the year as of the end of February stands at 244,439 compared to 226,729 for the same period last year.

LEAD, ZINC . . . Markets were generally quiet last week though volume was satisfactory. Demand for Special High Grade zinc from diecasters remains strong.

Some trade sources look for a slump in demand for zinc in the next few months though they do not believe production will be cut back appreciably. They believe producers' stocks may rise again which would unsettle the market. For this reason they maintain the government should continue its stockpiling to siphon off excess output.

TIN . . . Toward the end of last week the market was firm though quiet, reflecting strength in London. Tinplaters are not showing much interest—some say they are fairly well covered through June and will not come back into the market until the price dips.

SILVER . . . For the first time in more than 2 years price of silver changed. Early last week price of silver at New York increased 4.5¢ per ounce. Factor behind this was a reported sale 17 million ounces by the Bank of Mexico to Saudi Arabia. By week end, however, the price dropped 1.25¢ to 88.5¢. Producers had difficulty finding buyers at the higher price, but activity picked up slightly at the lower quote. Further reductions were anticipated.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Mar. 16	Mar. 17	Mar. 18	Mar. 19	Mar. 21	Mar. 22
Copper, electro, Conn.	33.00	33.00	33.00	33.00	33.00	33.00
Copper, Lake, delivered	33.00	33.00	33.00	33.00	33.00	33.00
Tin, Straits, New York	91.125	91.25	91.375		91.25	91.125*
Zinc, East St. Louis	11.50	11.50	11.50	11.50	11.50	11.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Note: Quotations are going prices **Tentative*

COPPER DETERMINATION

Alloymet 2030 (65% Nickel 30% Copper 5% Iron)*

A product of close Metallurgical CONTROL
for the production of low alloy steel and gray iron

Pre-alloyed master alloys are leaving an indelible mark on the iron and steel industry. The element of human error is reduced many fold, since a single alloying agent, ALLOYMET 2030 ingot or shot, can replace many separate inoculants. A single trial of Alloymet 2030 or its companion alloys will make you an "Alloymet regular."

For further information, write us for our booklet, "Master Alloys."

*Nominal Chemical Composition

ALTER COMPANY
Alloy Metal Division
1701 Rockingham Road, DAVENPORT, IOWA
Phone 6-2561 Teletype DV 588

Nonferrous Prices *(Effective Mar. 22, 1955)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Alloy	Flat Sheet		Plate	
	0.032 in.	0.061 in.	0.136-0.249 in.	0.250-3.000 in.
1100, 3003	39.1	37.1	35.9	35.5
5004	44.0	39.8	38.1	37.6
5052	46.7	41.9	40.2	39.3
2024-O, -OAL	49.4	40.8	39.3	39.4
7075-O, -OAL	60.8	49.1	46.8	46.8

Extruded Solid Shapes: Shape factors 1 to 6, 38.7¢ to 86.7¢; 12 to 14, 39.4¢ to $1.04; 24 to 26, 42.2¢ to $1.35; 36 to 38, 49.8¢ to $1.97.

Rod, Round: Rolled, 1.064-4-5 in. 1100-F, 43.6¢ to 46.1¢; cold finished, 0.375-3.499 in., 1100-F, 47.9¢ to 42.4¢.

Screw Machine Stock: Rounds, 2011-T3, ½-11/32 in., 63.5¢ to 50.1¢; ⅝-1½ in., 49.9¢ to 46.9¢; 1 9/16-3 in., 45.7¢ to 42.7¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051-0.374 in., 1100, 47.1¢ to 35.8¢; 5052, 56.7¢ to 44.4¢; 2017-T4, 64.3¢ to 44.7¢; 6061-T4, 59.5¢ to 44.1¢.

Extruded Tubing: Rounds, 6063-T5, OD 1¼-2 in., 44.4¢ to 54.8¢; 2-4 in., 40.3¢ to 54.6¢; 4-6 in., 40.5¢ to 49.3¢; 6-9 in., 41.4¢ to 52.1¢.

Roofing Sheet: Flat, per sheet, 0.032-in., 42⅝ x 60-in., $2.998; x 96-in., $4.801; x 120-in., $6.002; x 144-in., $7.202. Coiled sheet, per lb, 0.019 in. x 28 in., 30.9¢.

Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: FS1-O ¼ in., 56¢; 3/16 in., 67¢; ⅛ in., 80¢; 0.064 in., 73¢; 0.032 in., 94¢. Specification grade higher. Base 50,000 lb.

Extruded Round Rod: M, diam ¼ to 0.311 in., 77¢; ½ to ⅝ in., 60.5¢; 1¼ to 1.749 in., 56¢; 2½ to 5 in., 51.5¢. Other alloys higher. Base up to ⅝ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: M. In weight per ft per perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 65.3¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.049 to 0.057 in. wall thickness: OD ¼ to 5/16 in., $1.43; 5/16 to ⅝ in., $1.29; ½ to ⅝ in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall: OD, ⅝ to ⅞ in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1½ in., 10,000 lb; 1½ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $9; Forgings, $9.

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	102	78	99
Strip, CR	102	87	126
Rod, Bar, HR	87	69	93
Angles, HR	87	69	93
Plate, HR	97	82	95
Seamless Tube	122	108	153
Shot, Blocks		65	

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	49.79		51.86
Copper, h-r	51.76	48.11	
Copper, drawn		49.36	
Low brass	47.35	47.29	
Yellow brass	44.27	44.21	
Red brass	48.44	48.38	
Naval brass		42.49	42.75
Leaded brass	44.27	35.36	41.41
Com. bronze	50.08	50.02	
Mang. bronze		46.02	47.58
Phos. bronze	70.12	70.62	
Munts metal		42.15	43.40
Nickel silver, 10 pct	58.35	60.58	

Beryllium copper, CR, 1.9% Be, Base 2000 lb, f.o.b.
Strip $1.71
Rod, bar, wire 1.68

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed 23.20
Aluminum pig 21.50
Antimony, American, Laredo, Tex. 28.50
Beryllium copper, per lb conta'd Be. $40.00
Beryllium aluminum 5% Be, Dollars per lb contained Be $72.75
Bismuth, ton lots $2.25
Cadmium, del'd $1.70
Cobalt, 97-99% (per lb) ..... $2.60 to $2.67
Copper, electro, Conn. Valley 23.00
Copper, Lake, delivered 23.00
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.8%, dollars per troy oz. .. $2.25
Iridium, dollars per troy oz. .. $110 to $120
Lead, St. Louis 14.80
Lead, New York 15.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig 27.00
ingot 27.75
Magnesium, sticks, 100 to 500 lb, 46.00 to 48.00
Mercury, dollars per 76-lb flask, f.o.b. New York ..... $322 to $324
Nickel electro, f.o.b. N. Y. warehouse 67.67
Nickel oxide sinter, at Copper Cliff, Ont., contained nickel 60.75
Palladium, dollars per troy oz. .. $18 to $20
Platinum, dollars per troy oz. .. $78 to $80
Silver, New York, cents per troy oz. 89.50
Tin, New York 91.125
Titanium, sponge, grade A-1, ... 34.50
Zinc, East St. Louis 11.50
Zinc, New York 12.00
Zirconium copper, 50 pct $6.20

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot
No. 115 ..... 34.00
No. 120 ..... 33.50
No. 123 ..... 33.00
80-10-10 ingot
No. 305 ..... 38.00
No. 315 ..... 35.75
88-10-2 ingot
No. 210 ..... 47.75
No. 215 ..... 44.25
No. 245 ..... 39.25
Yellow ingot
No. 405 ..... 29.75
Manganese bronze
No. 421 ..... 32.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper, max. 31.50-32.50
0.60 copper, max. 31.25-32.25
Piston alloys (No. 122 type) .. 30.00-31.50
No. 12 alum. (No. 2 grade) ... 29.25-30.25
108 alloy 30.00-31.00
195 alloy 31.00-32.50
13 alloy (0.60 copper max.) ... 31.25-32.25
ASX-679 ..... 30.00-31.00

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-97½% 31.50-32.50
Grade 2—92-95% 30.50-31.50
Grade 3—90-92% 29.75-30.50
Grade 4—85-90% 28.75-29.50

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper
Cast, oval, 15 in. or longer 44.92
Electrodeposited 39.78
Flat rolled 45.42
Brass, 80-20
Cast, oval, 15 in. or longer 43.515
Zinc, flat cast 20.25
Ball, anodes 18.50
Nickel, 99 pct plus
Cast 90.50*
Cadmium $1.70
Silver 999 fine, rolled, 100 oz. lots per troy oz., f.o.b. Bridgeport, Conn. 94½

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum 63.00
Copper sulphate, 99.5 crystals, bbl. 12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed 31.25*
Nickel chloride, 300 to 400 lb. 43.50*
Silver cyanide, 100 oz. lots, per oz. 75½
Sodium cyanide, 96 pct domestic 200 lb drums 19.25
Zinc cyanide, 100 lb drum 54.50
*Effective Jan. 3.

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	21⅞	20½
Red brass	25½	24⅝
Comm. bronze	26⅝	25⅞
Mang. bronze	20⅝	19½
Yellow brass rod ends	21⅝	....

Custom Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 33½
No. 2 copper wire 32
Light copper 30¼
*Refinery brass 28
* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire ..... 32½—33½
No. 2 copper wire ..... 31 —32
Light copper ..... 29 —30
No. 1 composition ..... 27 —27½
No. 1 comp. turnings ..... 26¾—27¼
Rolled brass 20½
Brass pipe ..... 21 —21½
Radiators ..... 21½—22

Aluminum

Mixed old cast. ..... 18 —18½
Mixed new clips ..... 18¾—20½
Mixed turnings, dry ..... 18 —19
Pots and pans ..... 18 —19

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire. 30 —30½
No. 2 heavy copper and wire. 29 —29½
Light copper ..... 27 —27½
New type shell cuttings ..... 27 —27½
Auto radiators (unsweated) .. 19 —19½
No. 1 composition ..... 24 —24½
No. 1 composition turnings ... 23 —23½
Unlined red car boxes ..... 18½—19
Cocks and faucets ..... 20 —20½
Mixed heavy yellow brass ... 17½—18
Old rolled brass ..... 18 —18½
Brass pipe ..... 20 —20½
New soft brass clippings .... 21½—22
Brass rod ends ..... 19 —20
No. 1 brass rod turnings .... 18½—19

Aluminum

Alum. pistons and struts .... 11½—12½
Aluminum crankcases ..... 15½—16
1100 (2S) aluminum clippings 18 —18½
Old sheet and utensils ..... 15½—16
Borings and turnings ..... 9½—10
Misc. cast aluminum ..... 14½—15
2024 (24s) clippings ..... 15 —15½

Zinc

New zinc clippings 7
Old zinc 5½
Zinc routings ..... 3½— 3⅝
Old die cast scrap ..... 3¼— 3½

Nickel and Monel

Pure nickel clippings 57
Clean nickel turnings 40
Nickel anodes 57
Nickel rod ends 57
New Monel clippings 28
Clean Monel turnings 21
Old sheet Monel 26
Nickel silver clippings, mixed. 15½
Nickel silver turnings, mixed. 13½

Lead

Soft scrap lead ..... 11½—11⅝
Battery plates (dry) ..... 6½— 6⅝
Batteries, acid free 4¼

Magnesium

Segregated solids ..... 18½—19
Castings ..... 17½—18

Miscellaneous

Block tin ..... 70 —75
No. 1 pewter ..... 50 —55
No. 1 auto babbitt 45
Mixed common babbitt ..... 12 —12½
Solder joints 17
Siphon tops 45
Small foundry type 16½
Monotype 15
Linc. and stereotype ..... 13½—14
Electrotype ..... 12½—12⅝
Hand picked type shells ..... 9½—10
Linc. and stereo. dross 6½
Electro dross 5

IRONAGE

STEEL PRICES

(Effective Mar. 22, 1955)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$86.00 *B3*		4.30 *B3*	6.45 *B3*	4.30 *B3*						
	Buffalo, N. Y.	$64.00 *B3*	$78.00 *B3, R3*	$86.00 *B3, R3*	5.075 *B3*	4.30 *B3*	6.45 *B3*	4.30 *B3*	4.05 *B3,R3*	5.75 *R7*	6.15 *B3*	8.425 *B3*		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.								4.10 *A2*	5.80 *A2*	6.15 *A2*			
	New Bedford, Mass.									6.20 *R6*				
	Johnstown, Pa.	$64.00 *B3*	$78.00 *B3*	$86.00 *B3*		4.30 *B3*	6.45 *B3*		4.05 *B3*					
	Fairless, Pa.													
	New Haven, Conn.									6.20 *D1* 6.50 *A5*				
	Phoenixville, Pa.					4.20 *P2*		4.30 *P2*						
	Sparrows Pt., Md.								4.05 *B3*	5.75 *B3*	6.15 *B3*	8.425 *B3*		
	Bridgeport, Wallingford, Conn.	$69.00 *N8*	$83.00 *N8*						4.35 *N8*	6.20 *W1*			7.00 *N8*	
	Pawtucket, R. I. Worcester, Mass.									6.30 *N7* 6.60 *A5*				12.75 *A5* 12.80 *N7*
MIDDLE WEST	Alton, Ill.								4.225 *L1*					
	Ashland, Ky.								4.05 *A7*					
	Canton-Massillon, Dover, Ohio		$80.00 *R3*	$86.00 *R3, T5*										12.45 *G4*
	Chicago, Ill.	$64.00 *U1*	$78.00 *R3, U1,W8*	$86.00 *U1, W8,R3*	5.075 *U1*	4.25 *U1, W8*	6.40 *U1, Y1*	4.25 *U1*	4.05 *A1,N4 W8*	5.85 *A1*				
	Cleveland, Ohio									5.75 *A5,J3*		8.60 *A5*		12.45 *A5*
	Detroit, Mich.			$86.00 *R5*					4.15 *G3,M2*	5.85 *D1,D2, G3,M2,P11*	6.25 *G3*	8.70 *D2, G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$64.00 *U1*	$78.00 *U1*	$86.00 *U1, Y1*	5.075 *I3*	4.25 *I3, U1*	6.40 *U1, I3*		4.05 *I3, U1,Y1*	5.85 *I3*	6.15 *U1, I3,Y1*	8.60 *Y1*	6.70 *U1, Y1*	
	Sterling, Ill.								4.15 *N4*					
	Indianapolis, Ind.									5.90 *C5*				
	Newport, Ky.												6.70 *Y3*	
	Middletown, Ohio									5.75 *A7*				
	Niles, Warren, Ohio Sharon, Pa.								4.05 *S1,R3*	5.75 *S1,R3, T4*	6.15 *S1, R3*	8.60 *S1, R3*	6.70 *S1*	12.45 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$64.00 *U1, J3*	$78.00 *J3, U1,C11*	$86.00 *U1, C11*	5.075 *U1*	4.25 *J3, U1*	6.40 *J3, U1*	4.25 *U1*	4.05 *P6*	5.75 *B4,J3*			6.70 *S9*	12.45 *S9*
	Portsmouth, Ohio								4.05 *P7*	5.75 *P7*				
	Weirton, Wheeling, Follansbee, W. Va.					4.25 *W3*			4.05 *W3*	5.75 *F3,W3*	6.15 *W3*	8.60 *W3*		
	Youngstown, Ohio		$78.00 *C10*	$86.00 *Y1, C10*		4.25 *Y1*	6.40 *Y1*		4.05 *U1,Y1*	5.75 *Y1,C5*	6.15 *U1, Y1*	8.60 *Y1*	6.70 *U1, Y1*	12.45 *C5*
WEST	Fontana, Cal.	$72.00 *K1*	$86.00 *K1*	$105.00 *K1*		4.90 *K1*	7.05 *K1*	5.25 *K1*	4.825 *K1*	7.50 *K1*	7.25 *K1*		8.10 *K1*	14.55 *K1*
	Geneva, Utah		$78.00 *C7*			4.25 *C7*	6.40 *C7*							
	Kansas City, Mo.					4.30 *S2*	6.45 *S2*				6.40 *S2*		6.95 *S2*	
	Los Angeles, Torrance, Cal.		$87.50 *B2*	$106.00 *B2*		4.95 *B2, C7*	7.10 *B2*		4.80 *B2,C7*	7.80 *C1*				
	Minnequa, Colo.					4.70 *C6*			5.15 *C6*					
	Portland, Ore.					5.00 *O2*								
	San Francisco, Niles, Pittsburgh, Cal.		$87.50 *B2*			4.90 *B2* 4.95 *P9*	7.05 *B2*		4.80 *B2,C7*					
	Seattle, Wash.		$91.50 *B2*			5.00 *B2*	7.15 *B2*		5.05 *B2, P12*					
SOUTH	Atlanta, Ga.								4.25 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$64.00 *T2*	$78.00 *T2*			4.25 *C16, R3,T2*	6.40 *T2*		4.05 *R3, T2C16*		6.15 *T2*			
	Houston, Tex.		$83.00 *S2*	$91.00 *S2*		4.30 *S2*	6.45 *S2*				6.40 *S2*		6.95 *S2*	

IRON AGE

STEEL PRICES

(Effective Mar. 22, 1955)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized *10* ga.	Enameling *12* ga.	Long Terne *10* ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Hollowware Enameling *29* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.05 *B3*	4.95 *B3*				6.10 *B3*	7.50 *B3*			4.675 *W6*			
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	4.10 *A2*	5.00 *A2*				6.15 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										4.675 *B3*			
	Fairless, Pa.	4.10 *U1*	5.00 *U1*				6.15 *U1*	7.55 *U1*				$8.90 *U1*	$7.60 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.05 *B3*	4.95 *B3*	5.45 *B3*			6.10 *B3*	7.50 *B3*	8.20 *B3*		4.775 *B3*	$8.90 *B3*	$7.60 *B3*	
	Worcester, Mass.										4.975 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										4.85 *L1*			
	Ashland, Ky.	4.05 *A7*		5.45 *A7*	5.375 *A7*									
	Canton-Massillon, Dover, Ohio			5.45 *R1, R3*						5.175 *R1*				
	Chicago, Joliet, Ill.	4.05 *A1, W8*					6.10 *U1*				4.675 *A5, N4, R3*			
	Sterling, Ill.										4.775 *N4*			
	Cleveland, Ohio	4.05 *J3, R3*	4.95 *J3, R3*		5.375 *R3*		6.10 *J3, R3*	7.50 *J3, R3*			4.675 *A5*			
	Detroit, Mich.	4.15 *G3, M2*	5.05 *G3*				6.20 *G3*	7.60 *G3*						
	Newport, Ky.	4.05 *N5*	4.95 *N5*	5.45 *N5*										
	Gary, Ind. Harbor, Indiana	4.05 *I3, U1, Y1*	4.95 *I3, U1, Y1*	5.45 *U1, I3*	5.375 *I3, U1*	5.85 *U1*	6.10 *U1, I3, Y1*	7.50 *U1, Y1*			4.675 *Y1*	$8.80 *I3, U1, Y1*	$7.50 *I3, U1, Y1*	6.20 *U1, Y1*
	Granite City, Ill.	4.25 *G2*	5.15 *G2*	5.65 *G2*	5.575 *G2*								$7.60 *G2*	6.30 *G2*
	Kokomo, Ind.	4.15 *C9*		5.55 *C9*						5.20 *C9*	4.775 *C9*			
	Mansfield, Ohio					5.85 *E2*				5.175 *E2*				
	Middletown, Ohio		4.95 *A7*		5.375 *A7*	5.85 *A7*								
	Niles, Ohio Sharon, Pa.	4.05 *S1, R3* 5.30 *N3*	4.95 *R3* 5.975 *N3*	5.45 *N3*	6.725 *N3*	5.85 *N3*	6.10 *S1, R3*	7.50 *R3*				$8.80 *R3*	$7.50 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.05 *J3, U1, P6*	4.95 *J3, U1, P6*	5.45 *U1*	5.375 *U1*		6.10 *J3, U1*	7.50 *J3, U1*	8.20 *U1*		4.675 *A5* 4.875 *P6*	$8.80 *J3, U1*	$7.50 *J3, U1*	6.20 *U1*
	Portsmouth, Ohio	4.05 *P7*	4.95 *P7*								4.675 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.05 *W3, W5*	4.95 *W3, W5, F3*	5.45 *W3, W5*		5.85 *W3, W5*	6.10 *W3*	7.50 *W3*				$8.80 *W3, W5*	$7.50 *W3, W5*	6.20 *F3, W5*
	Youngstown, Ohio	4.05 *U1, Y1*	4.95 *Y1*		5.375 *Y1*		6.10 *U1, Y1*	7.50 *Y1*			4.675 *Y1*			
WEST	Fontana, Cal.	4.825 *K1*	6.05 *K1*				6.875 *K1*	8.55 *K1*			5.475 *K1*			
	Geneva, Utah	4.15 *C7*												
	Kansas City, Mo.										4.925 *S2*			
	Los Angeles, Torrance, Cal.										5.475 *C7, B2*			
	Minnequa, Colo.										4.925 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	4.75 *C7*	5.90 *C7*	6.20 *C7*							5.325 *C7*	$9.55 *C7*	$8.25 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.05 *R3, T2*	4.95 *T2*	5.45 *R3, T2*			6.10 *T2*			5.35 *R3*	4.675 *T2, R3*	$8.90 *T2*	$7.60 *T2*	
	Houston, Tex.										4.925 *S2*			

† Special coated mfg. terne deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb. coke base box.

* COKES: 1.50-lb. add 25¢.

ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.10. Differential 1.00 lb. 0.25 lb. add 85¢.

IRON AGE

STEEL PRICES

(Effective Mar. 22, 1955)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				5.075 *B3*	6.625 *B3*	6.45 *B3*					
	Buffalo, N. Y.	4.30 *B3,R3*	4.30 *B3,R3*	5.45 *B5*	5.075 *B3,R3*	6.625 *B3,B5*	6.45 *B3*	4.225 *B3,R3*			6.45 *B3*	5.75 *W6*
	Claymont, Del.							4.225 *C4*		5.80 *C4*		
	Coatesville, Pa.							4.225 *L4*		5.80 *L4*	6.45 *L4*	
	Conshohocken, Pa.							4.225 *A2*	5.275 *A2*		6.45 *A2*	
	Harrisburg, Pa.							4.225 *C3*	5.275 *C3*			
	Hartford, Conn.			5.90 *R3*		6.925 *R3*						
	Johnstown, Pa.	4.30 *B3*	4.30 *B3*		5.075 *B3*		6.45 *B3*	4.225 *B3*		5.80 *B3*	6.45 *B3*	5.75 *B3*
	Fairless, Pa.	4.45 *U1*	4.45 *U1*		5.225 *U1*							
	Newark, N. J.			5.85 *W10*		6.80 *W10*						
	Camden, N. J.			5.85 *P10*								
	Bridgeport, Putnam, Conn.	4.55 *N8*		5.95 *W10*	5.225 *N8*			4.475 *N8*				
	Sparrows Pt., Md.		4.30 *B3*					4.225 *B3*		5.80 *B3*	6.45 *B3*	5.85 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			5.85 *W11* 5.95 *B5,C14*		6.925 *A5,B5*						6.05 *A5, W6*
MIDDLE WEST	Alton, Ill.	4.50 *L1*										5.925 *L1*
	Ashland, Newport, Ky.							4.225 *A7,N5*		5.80 *N5*		
	Canton-Massillon, Mansfield, Ohio	4.40 *R3*		5.40 *R2,R3*	5.075 *R3,T5*	6.625 *R2,R3, T5*		4.225 *E2*				
	Chicago, Joliet, Ill.	4.30 *U1, N4,W8,R3*	4.30 *N4,R3*	5.40 *A5,W10, W8,B5,L2*	5.075 *U1,R3, W8*	6.625 *A5,W8, W10,L2,B5*		4.225 *U1,W8, I3,A1,R3*	5.275 *U1*	5.80 *U1*	6.45 *U1*	5.75 *A5, R3,N4,W7*
	Cleveland, Ohio	4.30 *R3*	4.30 *R3*	5.40 *A5,C13*		6.625 *A5,C13*	6.45 *R3*	4.225 *J3,R3*	5.275 *J3*		6.45 *J3,R3*	5.75 *A5, C13*
	Detroit, Mich.	4.40 *G3* 4.45 *R5*		5.40 *R3* 5.60 *B5,P8* 5.65 *P3*	5.075 *R5* 5.175 *G3*	6.625 *R5* 6.825 *B5,P3, P8*	6.55 *G3*	4.325 *G3*			6.55 *G3*	
	Duluth, Minn.											5.75 *A5*
	Gary, Ind. Harbor, Crawfordsville	4.30 *I3, U1, Y1*	4.30 *I3, U1, Y1*	5.40 *M5,R3*	5.075 *I3, U1, Y1*	6.625 *M5, R3*	6.45 *U1,I3, Y1*	4.225 *I3, U1,Y1*	5.275 *I3*	5.80 *U1,Y1*	6.45 *U1,I3, Y1*	5.85 *M4*
	Granite City, Ill.							4.425 *G2*				
	Kokomo, Ind.											5.85 *C9*
	Sterling, Ill.	4.40 *N4*	4.40 *N4*									5.85 *N4*
	Niles, Ohio Sharon, Pa.	4.30 *R3*					6.45 *R3*	4.225 *S1,R3*		5.80 *S1*	6.45 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.30 *J3, U1, C11*	4.30 *J3, U1*	5.40 *A5,C8, C11,J3, W10,B4,R3*	5.075 *U1,C11*	6.625 *A5,C11, W10,C8,R3*	6.45 *J3, U1*	4.225 *J3, U1*	5.275 *U1*	5.80 *U1*	6.45 *J3, U1*	5.75 *A5,J3, P6*
	Portsmouth, Ohio											5.75 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.30 *W3*						4.225 *W3, W5*				
	Youngstown, Ohio	4.30 *U1,Y1, C10,R3*	4.30 *U1,Y1, R3*	5.40 *F2,Y1, C10*	5.075 *U1,Y1, C10*	6.625 *Y1,C10* 6.665 *F2*	6.45 *U1,Y1*	4.225 *U1,Y1, R3*		5.80 *Y1*	6.45 *Y1*	5.75 *Y1*
WEST	Emeryville, Cal.	5.05 *J5*	5.05 *J5*									
	Fontana, Cal.	5.00 *K1*	5.00 *K1*		6.125 *K1*		7.70 *K1*	4.875 *K1*		6.45 *K1*	7.15 *K1*	
	Geneva, Utah							4.225 *C7*			6.45 *C7*	
	Kansas City, Mo.	4.55 *S2*	4.55 *S2*		5.325 *S2*		6.70 *S2*					6.00 *S2*
	Los Angeles, Torrance, Cal.	5.00 *B2,C7*	5.00 *B2,C7*	6.85 *R3*	6.125 *B2*		7.15 *B2*					6.70 *B2*
	Minnequa, Colo.	4.75 *C6*	4.75 *C6*					5.075 *C6*				6.00 *C6*
	Portland, Ore.	5.05 *O2*	5.05 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.00 *C7,P9* 5.05 *B2*	5.00 *C7,P9* 5.05 *B2*				7.20 *B2*					6.70 *C7*
	Seattle, Wash.	5.05 *B2,P12, N6*	5.05 *B2,P12*				7.20 *B2*	5.125 *B2*		6.70 *B2*	7.35 *B2*	
SOUTH	Atlanta, Ga.	4.50 *A8*	4.50 *A8*									5.95 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	4.30 *T2,C16, R3*	4.30 *T2,C16, R3*				6.45 *T2*	4.225 *T2,R3*			6.45 *T2*	5.75 *R3, T2*
	Houston, Ft. Worth, Lone Star, Tex.	4.55 *S2*	4.55 *S2*		5.325 *S2*		6.70 *S2*	4.55 *L3* 4.275 *S2*		5.65 *S2*	6.50 *S2*	6.00 *S2*

Steel Prices *(Effective Mar. 22, 1955)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, New York
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Disston & Sons, Inc., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P12 Pacific Steel Rolling Mills, Seattle

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Fort Worth

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.

Y1 Youngstown Sheet & Tube Co., Youngstown

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																						
Sparrows Pt. *B3*	21.75	6.5	24.75	10.5	27.25	14.0	29.75	14.75	30.25	15.75	30.75	16.25	32.25	16.0	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	10.75	+4.5	13.75	+0.5	16.25	3.0	18.75	3.75	19.25	4.75	19.75	5.25	21.25	5.0	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	13.5	+1.50	17.5	0.75	20.0	3.25	21.5	4.75
Alton Ill. *L1*	21.75	6.5	24.75	10.5	27.25	14.0	29.75	14.75	30.25	15.75	30.75	16.25	32.25	16.0	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	21.75	6.5	24.75	10.5	27.25	14.0	29.75	14.75	30.25	15.75	30.75	16.25	32.25	16.0	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	13.5	+1.50	17.5	0.75	20.0	3.25	21.5	4.75
Wheeling *W5*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	13.5	+1.50	17.5	0.75	20.0	3.25	21.5	4.75
Indiana Harbor *Y1*	22.75	7.5	25.75	11.5	28.25	15.0	30.75	15.75	31.25	16.75	31.75	17.25	33.25	17.0	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	23.75	8.5	26.75	12.5	29.25	16.0	31.75	16.75	32.25	17.75	32.75	18.25	34.25	18.0	13.5	+1.50	17.5	0.75	20.0	3.25	21.5	4.75
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	25.25	11.5	29.25	15.5	31.25	19.0	31.75	17.75	32.25	18.75	32.75	19.25	33.25	18.0	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.25	35.25	20.0	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	25.25	11.5	29.25	15.5	31.25	19.0	31.75	17.75	32.25	18.75	32.75	19.25	33.25	18.0	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	14.25	.....	18.25	.....	20.25	.....	20.75	.....	21.25	.....	21.75	.....	22.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.25	35.25	20.0	14.0	.....	19.0	3.25	21.5	5.75	26.5	10.75
Alton, Ill. *L1*	25.25	11.5	29.25	15.5	31.25	19.0	31.75	17.75	32.25	18.25	32.75	19.25	33.25	18.0	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.75	35.25	20.0	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.75	35.25	20.0	14.0	.....	19.0	3.25	21.5	5.75	26.5	10.75
Wheeling *W5*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.75	35.25	20.0	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.75	35.25	20.0	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.75	35.25	20.0	14.0	.....	19.0	3.25	21.5	5.75	26.5	10.75
Indiana Harbor *Y1*	26.25	12.5	30.25	16.5	32.25	20.0	32.75	18.75	33.25	19.75	33.75	20.75	34.25	19.0	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	27.25	13.5	31.25	17.5	33.25	21.0	33.75	19.75	34.25	20.75	34.75	21.75	35.25	20.0	14.0	.....	19.0	3.25	21.5	5.75	26.5	10.75

Threads only, buttweld and seamless 2¼ pt higher discount. Plain ends, buttweld and seamless, 3-in. and under, 6½ pt. higher discount. Buttweld jobbers discount, 5 pct.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ incl. per lb, East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt. e.g., zinc price range of over 11¢ to 13¢ would lower discounts; zinc price in range of over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

Steel Prices

(Effective Mar. 22, 1955)

To identify producers, see Key on preceding page.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	4.45	5.35	5.425				
So. Chicago *R3*				7.30			
Ensley *T2*	4.45	5.35					
Fairfield *T2*		5.35		7.30		5.275	
Gary *U1*	4.45	5.35				5.275	
Ind. Harbor *I3*	4.45		5.425	7.30		5.275	
Johnstown *B3*		5.35					
Joliet *U1*		5.35	5.425				
Kansas City *S2*				7.30			11.50
Lackawanna *B3*	4.45	5.35	5.425			5.275	
Minnequa *C6*	4.45	5.85	5.425	7.30		5.275	11.50
Pittsburgh *O1*					11.00		11.50
Pittsburgh *P5*					11.00		11.50
Pittsburgh *J3*				7.30			
Seattle *B2*				7.80		5.425	12.00
Steelton *B3*	4.45		5.425			5.275	
Struthers *Y1*				7.30			
Torrance *C7*						5.425	
Williamsport *S5*		5.35					
Youngstown *R3*				7.30			

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	8.025	8.225	
Armature	8.50	8.75	9.25
Elect.	9.10	9.35	9.85
Motor	10.10	10.35	10.85
Dynamo	11.00	11.25	11.75
Trans. 72	11.95	12.20	12.70
Trans. 65	12.50	Grain Oriented	
Trans. 58	13.00	Trans. 80	16.60
Trans. 52	14.00	Trans. 73	17.10

Producing points: Beech Bottom (*W5*); Brackenridge (*A5*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N5*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*).

* Coils 75¢ higher.

CLAD STEEL

Stainless-carbon	Plate	Sheet
No. 304, 20 pct. Coatesville, Pa., *L4*	*33.60	
Washington, Pa., *J2*	.....	
Claymont, Del., *C4*	.....	
New Castle, Ind., *I2*	.....	29.75
Nickel-carbon 10 pct. Coatesville, Pa., *L4*	39.50	
Inconel-carbon 10 pct., Coatesville, Pa., *L4*	47.90	
Monel-carbon 10 pct. Coatesville, Pa., *L4*	40.80	

* Includes annealing and pickling, sandblasting.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence 9-15½ ga.	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld	Merch. Wire* Galv.
	Col	Col	Col	Col	¢/lb.	¢/lb.	¢/lb.
Alabama City *R3*	137	146		155	150	6.90	7.30
Aliquippa, Pa. *J3*	137	149			156	6.90	7.425
Atlanta *A8*	139	151		157	164	7.00	7.525
Bartonville *K2*	139	151		157	164	7.00	7.55
Buffalo *W6*						6.90	7.30
Chicago, Ill. *N4*	137	149		155	162	6.90	7.45
Cleveland *A6*	142						
Cleveland *A5*						6.90	
Crawfordsville *M4*	139	151		157	159	7.00	7.55
Donora, Pa. *A5*	137	146		155	159	6.90	7.30
Duluth *A5*	137	146	150	155	159	6.90	7.30
Fairfield, Ala. *T2*	137	146		155	159	6.90	7.30
Galveston *D4*	139						
Houston *S2*	142	154			164	7.15	7.70
Johnstown, Pa. *B3*	137	149			162	6.90	7.45
Joliet, Ill. *A5*	137	146		155	159	6.90	7.30
Kokomo, Ind. *C9*	139	148		157	161	7.00	7.55
Los Angeles *B2*						7.85	
Kansas City *S2*	142	158		167	164	7.15	7.90
Minnequa *C6*	142	151	155	160	164	7.15	7.55
Monessen *P6*	137	151			163	6.90	7.45
Moline, Ill. *R3*			145				
Pittsburg, Cal. *C7*	156	169		179	179	7.85	8.25
Portsmouth *P7*						6.90	7.90
Rankin, Pa. *A5*	137	146			159	6.90	7.30
So. Chicago *R3*	137	146	145	155	159	6.90	7.30
S. San Francisco *C6*					179		
Sparrows Pt. *B3*	139			157	164	7.00	7.55
Struthers, O. *Y1*						6.90	7.55
Worcester *A5*	143					7.20	
Williamsport, Pa. *S5*			150				

Cut Nails, carloads, base $8.30 per keg at Conshohocken, Pa. (*A2*).

* Alabama City and So. Chicago don't include zinc extra. Galvanized products computed with zinc at 11.0¢ per lb.

WAREHOUSES

Base price, f.a.b. dollars per 100 lb.

City	City Delivery Charge	Sheets: Hot-Rolled	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: As rolled A 4615 As rolled	Alloy Bars: Hot-Rolled A 4140 Annealed	Alloy Bars: Cold-Drawn A 4615 As rolled	Alloy Bars: Cold-Drawn A 4140 Annealed
Baltimore	$.20	6.62	7.51	7.78	6.69	.....	6.37	6.72	6.68	8.52	.....	.....	.....	.....
Birmingham	.15	6.35–6.50	7.35–8.10	8.25–9.00	6.60	9.60	6.65	6.65	6.50	9.00	.....	.....	.....	.....
Boston	.10	7.23	8.23	9.52–9.62	7.47	9.65–9.85	7.34–7.37	7.49	7.20	8.60–8.70	13.00	12.60	15.40	15.25
Buffalo	.20	6.35	7.40[3]	8.80[3]	6.70	7.62	6.65	6.70	6.50	7.40[3]	12.70[3]	12.30[3]	15.10[3]	14.95[3]
Chicago	.20	6.38	7.38	8.30	6.62	.....	6.52	6.69	6.51	7.25	12.25	12.05	14.60	14.70
Cincinnati	.20	6.49–6.53	7.37–7.42	8.25–8.30	6.86–6.91	.....	6.81–6.86	6.91	6.75–6.80	7.55	12.55	12.35	14.90	15.00
Cleveland	.20	6.38	7.38	8.25	6.72	.....	6.69	7.02	6.57	7.35	11.96	12.11	.....	14.76
Denver		8.15	9.15	10.37	8.40	.....	8.10	8.15	8.30	9.27	.....	.....	.....	16.30
Detroit	.20	6.57	7.57	8.58	6.90	.....	6.80	7.16	6.79	7.54	12.65	12.25	15.05	14.80–14.90
Houston	.20	7.35	7.80	9.93	7.70	.....	7.35	7.60	7.70	9.50	.....	13.10	.....	.....
Kansas City	.20	7.05	8.05	8.95	7.29	.....	7.19	7.36	7.18	8.07–8.27	.....	12.27	.....	.....
Los Angeles	.20	7.50	9.35	9.95	7.85	.....	7.45	7.65	7.45	10.15	.....	13.35	.....	16.50
Memphis	.10	6.79	7.69	.....	6.90	.....	7.01	7.09	6.88	8.24	.....	.....	.....	.....
Milwaukee	.20	6.47	7.47	8.21–8.39	6.71	.....	6.61	6.86	6.60	7.44	12.34	12.14	14.69	14.79
New Orleans	.15	6.70	7.65	9.23	6.80	.....	6.90–6.95	7.05	6.80	8.70–10.70	.....	.....	.....	.....
New York	.10	6.97–6.98	7.78–8.46	8.79[3] 8.99	7.36–7.56	.....	7.18–7.27	7.13–7.38	7.30–7.37	8.63–8.73[2]	12.63	12.43	.....	15.08
Norfolk	.20	7.00	.....	.....	7.10	.....	7.10	7.10	7.10	8.60	.....	.....	.....	.....
Philade'phia	.10	6.19	7.29[3]	8.09[4] 8.23	6.94	.....	6.49	6.54	6.74	8.19[3]	.....	11.66–12.21	.....	14.86
Pittsburgh	.20	6.38	7.38	8.30–8.50	6.72–6.75	.....	6.52	6.69	6.51	7.85	12.25	12.05	14.60	14.70
Portland	.20	7.00	7.75	9.05	7.25	.....	6.85	7.00	7.05	10.20	.....	.....	.....	.....
Salt Lake City	.20	7.65	10.20	10.70	9.05	.....	7.70	7.70–8.85	8.80	10.95	.....	.....	.....	.....
San Francisco	.20	7.55	8.95	9.35–9.85	7.80	.....	7.40	7.50	7.35	10.05	.....	13.35	.....	16.50
Seattle	.00	8.10	9.80	10.15	8.20	.....	7.80	7.75	7.80	10.95	.....	13.80	.....	16.45
St. Louis	.20	6.62–6.67	7.67	8.54–8.59	6.91	.....	6.81	7.09	6.80	7.64	12.54	12.34	14.84–14.89	14.99
St. Paul	.15	7.03	8.03–8.58	8.96	7.28	.....	7.19	7.35	7.16	8.01	.....	12.56	.....	15.21

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions: ([1]) 1500 to 9999 lb. ([2]) 1000 lb or over. ([3]) $.25 delivery. ([4]) 1000 to 1999 lb, $.35 delivery.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bridgeport, New Britain, Conn. *N8*	5.75	8.05	9.00	11.15	13.85
Buffalo, N. Y. *R7*	5.75	8.05	9.00	10.95	13.25
Carnegie, Pa. *S9*		8.05	9.00	11.15	13.85
Cleveland *A5*	5.75	8.05	9.00	11.15	13.85
Detroit *D1*	5.85	8.25	9.20	10.95	.....
Detroit *D2*	5.85	8.25	9.20	.....	.....
Harrison, N. J. *C11*	.....	.....	9.30	11.45	14.15
Indianapolis *C5*	6.00	8.20	9.00	11.15	13.85
New Castle, Pa. *B4*	5.75	8.05	9.00	10.95	.....
New Haven, Conn. *D1*	6.20	8.35	9.30	11.25	.....
Pawtucket, R. I. *N7*	6.30	8.35	9.30	11.45	14.15
Riverdale, Ill. *A1*	5.85	8.05	9.00	11.15	13.85
Sharon, Pa. *S1*	5.75	8.05	9.00	11.15	13.85
Trenton *R6*	.....	8.35	9.30	11.25	13.40
Wallingford *W1*	6.20	8.35	9.30	11.45	14.15
Warren, Ohio *T4*	5.75	8.05	9.00	11.15	13.85
Weirton, W. Va. *W3*	5.85	8.05	9.00	10.95	13.25
Worcester, Mass. *A5*	6.00	8.35	9.30	11.45	14.15
Youngstown *C3*	5.85	8.05	9.00	11.15	13.85

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	28.33	33.97	27.48	32.95
	2½	12	38.15	45.74	37.00	44.36
	3	12	44.05	52.82	42.72	51.23
	3½	11	51.43	61.66	49.88	59.81
	4	10	68.29	81.88	66.24	79.42
National Tube	2	13	28.33	33.97	27.48	.....
	2½	12	38.15	45.74	37.00	.....
	3	12	44.05	52.82	42.72	.....
	3½	11	51.43	61.66	49.88	.....
	4	10	68.29	81.88	66.24	.....
Pittsburgh Steel	2	13	28.33	33.97	.....	.....
	2½	12	38.15	45.74	.....	.....
	3	12	44.05	52.82	.....	.....
	3½	11	51.43	61.66	.....	.....
	4	10	68.29	81.88	.....	.....

Miscellaneous Prices

(Effective Mar. 22, 1955)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb
18	4	1	—	—	$1.54
18	4	1	—	5	2.245
18	4	2	—	—	1.705
1.5	4	1.5	8	—	.90
6	4	2	6	—	1.29

High-carbon chromium ..... .73
Oil hardened manganese ..... .405
Special carbon ..... .37
Extra carbon ..... .31
Regular carbon ..... .26

Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.

CAST IRON WATER PIPE

Per Net Ton

6 to 24-in., del'd Chicago $111.80 to $115.30
6 to 24 in., del'd N. Y... 115.00 to 116.00
6 to 24-in., Birmingham 98.00 to 102.50
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipments less ..... $129.50 to $131.50
Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. Prices effective for 1955 season.

Gross Ton

Openhearth lump $11.25
Old range, bessemer 10.40
Old range, nonbessemer 10.25
Mesabi, bessemer 10.25
Mesabi, nonbessemer 10.10
High phosphorus 10.00

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. ..... $14.25 to $14.50
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. ..... $16.50 to $17.00
Foundry, oven coke
Buffalo, del'd $28.08
Chicago, f.o.b. 24.50
Detroit, f.o.b. 25.50
New England, del'd 26.05
Seaboard, N. J., f.o.b. 24.00
Philadelphia, f.o.b. 23.00
Swedeland, Pa., f.o.b. 23.00
Painesville, Ohio, f.o.b. 25.50
Erie, Pa., f.o.b. 25.00
Cleveland, del'd 27.43
Cincinnati, del'd 26.56
St. Paul, f.o.b. 23.75
St. Louis, f.o.b. 26.00
Birmingham, f.o.b. 22.65
Lone Star, Tex., f.o.b. 18.50

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON		
Diam. (In.)	Length (In.)	Price	Diam (In.)	Length (In.)	Price
24	84	20.50	40	100, 110	8 95
20	72	20.00	35	110	8 95
17 to 18	72	20.50	30	110	8 95
7 to 10	60	21.00	24	72 to 84	9 10
8	60	23.25	20	90	8 80
4	48	26.00	17	72	9 10
3	40	27.25	14	72	9 50
2½	30	29.00	10, 12	60	10 30
2	24	43.50	8	48	10 85

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolts

	Discount Less Case	C.
½ in. & smaller x 4 in. & shorter	2	22
⅝ in. & smaller x 6 in. & shorter	+3	18
9/16 in. & ⅝ in. x 6 in. & shorter	+4	17
¾ in. & larger x 6 in. & shorter	+6	15
All diam. longer than 6 in.	+15	8
½ in. & smaller x 6 in. & shorter	+3	18
Lag, all diam. x 6 in. & shorter	6	25
Lag, all diam. longer than 6 in.	+2	19
Plow bolts	23	23

Nuts, H.P., C.P., reg. & hvy.

	Base Discount	Discount, Case or Keg
¾" or smaller	55	64
⅞" to 1¼" inclusive	58	66
1⅜" to 1½" inclusive	60	67½

C.P. Hex. regular & hvy.

All sizes	55	64

Hot Galv. Nuts (all types)

¾" or smaller	38	50
⅞" to 1½" inclusive	41	52½

Finished, Semi-finished, Slotted or Castellated Nuts

All sizes	55	66

Rivets

Base per 100 lb

½ in. & larger $9.25

Pct Off List

7/16 in. and smaller 37

Cap Screws

	Discount Bright	H.C. Heat Treated
New std. hex head, packaged		
⅝" x 6" and smaller and shorter	38	28
¾", ⅞", 1" x 6" and shorter	15	1
New std. hex head, bulk*		
5" x 6" and smaller and shorter	50	42
¾", ⅞", 1" x 6" and shorter	32	21

*Minimum quantity per item:
15,000 pieces ⅛", 5/16", ⅜" diam.
5,000 pieces 7/16", ½", 9/16", ⅝" diam.
2,000 pieces ¾", ⅞", 1" diam.

Machine Screws & Stove Bolts

		Discount Mach. Screws	Stove Bolts
Packaged, package list		33	43
Bulk, bulk list			
	Quantity		
¼-in. diam. & under	15,000- 99,999	17	59
	100,000-199,999	25	63
	200,000 & over	33	67
5/16-in. diam. & larger	15,000- 49,999	17	59
	50,000- 99,999	25	63
	100,000 & over	33	67
All diam. over 3 in. long	5,000- 49,999	..	59
	50,000- 99,999	..	63
	100,000 & over	..	67

Machine Screw & Stove Bolt Nuts

		Discount Hex	Square
Packaged, package list		30	33
Bulk, bulk list			
	Quantity		
⅜-in. diam. & smaller	15,000- 99,999	15	17
	100,000-199,999	23	25
	200,000 & over	31	33

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00) .. $114.00
No. 1 Ohio 107.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 107.00
No. 2 Ohio 98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50) 17.00

Silica Brick

Mt. Union, Pa., Ensley, Ala. $120.00
Childs, Hays, Pa. 125.00
Chicago District 130.00
Western Utah .....
California .....
Super Duty
Hays, Pa., Athens, Tex., Windham 137.00
Curtner, Calif. 155.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) 20.00
Silica cement, net ton, bulk, Hays, Pa. 22.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala. 21.00
Silica cement, net ton, bulk, Utah and Calif. .....

Chrome Brick

Per net ton

Standard chemically bonded, Balt.. $86.00
Standards chemically bonded, Curtner, Calif. 96.25
Burned, Balt. 80.00

Magnesite Brick

Standard Baltimore $109.00
Chemically bonded, Baltimore 97.50

Grain Magnesite

Bt. ⅝-in. grains

Domestic, f.o.b. Baltimore in bulk fines removed $64.40
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 38.00
in sacks 43.75

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:
Pa., W. Va., Ohio $14.50
Midwest 15.10
Missouri Valley 13.65

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton; effective CaF_2 content.
72½% $44.00
70% or more 42.50
60% or less 38.00

METAL POWDERS

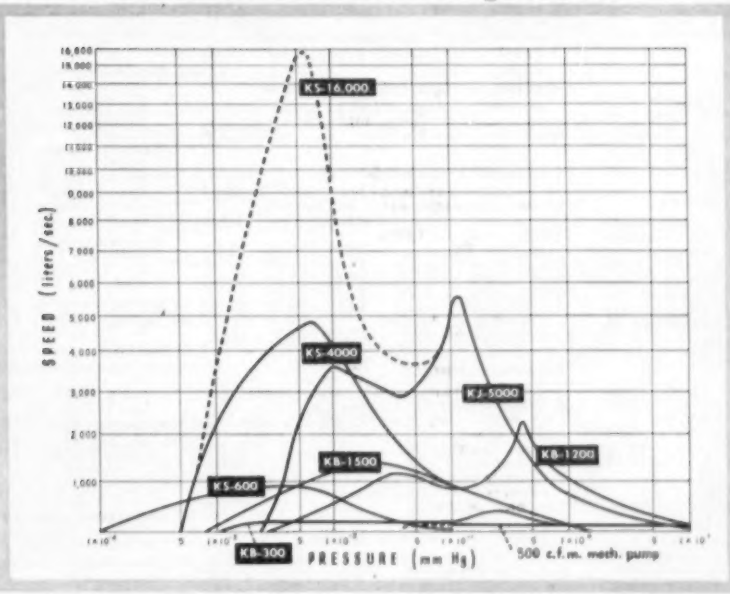
Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags.... 11.25¢
Canadian sponge iron,
Del'd in East ..... 12.0¢
F.o.b. ship. pt., carloads .. 9.5¢
Domestic sponge iron, 98+% Fe, carload lots ..... 9.5¢
Electrolytic iron, annealed, 99.5+% Fe ..... 38.0¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe 53.5¢
Hydrogen reduced iron minus 300 mesh, 98+% Fe..63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 00.8+% Fe..83.0¢ to $1.48
Aluminum ..... 21.5¢
Brass, 10 ton lots .....29.50¢ to 36.50¢
Copper, electrolytic ..... 49.50¢
Copper, reduced ..... 49.50¢
Cadmium, 100-199 lb. 95¢ plus metal value
Chromium, electrolytic, 99% min., and quality, del'd... $3.60
Lead ..... 23.50¢
Manganese ..... 57.0¢
Molybdenum, 99% $2.75
Nickel, unannealed ..... 89.50¢
Nickel, annealed ..... 96.50¢
Nickel, spherical, unannealed 93.50¢
Silicon ..... 43.50¢
Solder powder..7.0¢ to 9.0¢ plus met. value
Stainless steel, 302 ..... 91.0¢
Stainless steel, 316 ..... $1.10
Tin .....14.04¢ plus metal value
Tungsten, 99% (65 mesh) ... $4.05
Zinc, 10 ton lots .....17.5¢ to 25.0¢

These CVC pumps... are working in these vacuum metallurgy installations

KB-300	Titanium Sponge Production
KS-600	5-50 lb. Melting and Casting
KB-1200	1000 lb. Consumable Electrode Arc Melting
KB-1500	Multi-Batch Carbide Sintering
KS-4000	350-500 lb. Melting and Casting and Arc Melting 8" dia. ingots
KJ-5000	1000 lb. Melting and Casting at 3 to 25 microns pressure
KS-16,000	1000 lb. Melting and Casting at 0.8 to 15 microns pressure

and here's *how* they work



If you work or plan to work in vacuum metallurgy, you can profit by *CVC's* practical experience in the field.

CVC is currently designing, building and installing high vacuum furnaces which solve many unusual problems. The wide range of pumps used in these installations and the know-how we have obtained from our work with them can go far in helping to solve your problems.

We welcome the opportunity to discuss high vacuum metallurgy with you. For further information and a copy of our "Information Memo" on High Vacuum Metallurgy write to ***Consolidated Vacuum Corporation, Rochester 3, N. Y.*** (a subsidiary of Consolidated Engineering Corporation, Pasadena, California).

This 1000-lb. high vacuum melting and casting furnace is an example of efficient, economical design. The buyer is starting with 350-lb. melts. The 4800 liters-per-sec. speed of a single KS-4000 pump is more than adequate for 350-lb. melts (see graph). When he's ready for 1000-lb. melts, he simply adds another KS-4000 pump and a 1000-lb. coil and crucible.

CVC

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ROCHESTER 3, N.Y.

Headquarters for High Vacuum

sales offices: NEW YORK, N. Y. • CHICAGO, ILL. • BOSTON, MASS. • SAN FRANCISCO, CALIF. • CAMDEN, N. J.

Ferroalloy Prices

(Effective Mar. 22, 1955)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk, carloads, del'd, 65-72% Cr, 2% max Si.

0.025% C ..	36.00	0.15% C ...	32.75
0.025% C, Simplex ..	34.50	0.20% C ...	32.50
		0.50% C ...	32.25
0.06% C ...	34.50	1.00% C ...	32.00
0.10% C ...	34.00	2.00% C ...	32.75
65-69% Cr, 4-6% C			24.75
62-66 Cr, 4-6% C, 6.9% Si			25.60

S. M. Ferrochrome

Contract prices, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60.55% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	25.85
Ton lots	28.00
Less ton lots	29.50

High Nitrogen Ferrochrome

Low-carbon type 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10 max. C	$1.18
0.50% max. C	1.16
9 to 11% C	1.25

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed, lump 4-in. x down, 24.75¢ per lb contained Cr plus 12.00¢ per lb contained Si. Bulk 2-in. x down, 25.05¢ per lb contained Cr plus 10.80¢ per lb contained Si. Bulk 1-in. x down, 25.25¢ per lb contained Cr plus 11.00¢ per lb contained Si.

Calcium-Silicon

Contract price per lb of alloy, lump, delivered.

30-33% Ca, 60-65% Si, 3.00 max. Fe.

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.30
Less ton lots	23.30

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ¼ in. x 12 mesh.

Ton lots	17.50
Less ton lots	19.50

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	16.60
Ton lots	18.10
Less ton lots	19.35

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	17.50
Ton lots to carload packed	18.50
Less ton lots	20.00

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn:

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	9.50
Clairton, Pa.	9.50
Sheridan, Pa.	9.50
Philo, Ohio	9.50

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	11.85
Ton lots packed	13.65

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$84.00
19 to 21%	3% max.	86.00
21 to 23%	3% max.	88.50
23 to 25%	3% max.	91.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.00
Ton lots	43.50

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	30.00
Ton lots	32.00
250 to 1999 lb	34.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn ..... 21.25¢

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	32.00	33.85	35.05
0.07% max. C	29.95	31.80	33.80
0.15% max. C	28.45	30.30	31.50
0.30% max. C	26.95	28.80	30.00
0.50% max. C	26.45	28.30	29.50
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	23.45	25.30	26.50

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢.

Carload bulk	11.00
Ton lots	12.65
Briquet contract basis carlots, bulk, delivered, per lb of briquet	12.45
Ton lots, packed	14.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $85.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $88.00. Add $1.00 per ton for each additional 0.50% Si up to and including 17%. Add $1.45 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96% Si, 2% Fe	20.10	18.00
97% Si, 1% Fe	20.60	18.50

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	6.55
Ton lots	8.35

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.

25% Si	20.00	75% Si	14.40
50% Si	12.00	85% Si	16.10
65% Si	13.50	90% Si	17.25

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.95	$2.95	$3.75
Less ton lots	3.40	3.30	4.55

Ferrovanadium

35-55% contract, basis, delivered, per pound, contained V.

Openhearth	$3.00-$3.10
Crucible	3.10- 3.20
High speed steel (Primos)	3.20- 3.25

Alsifer, 20% Al, 40% Si, 40% Fe,

Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	9.25¢
Ton lots	10.15

Calcium molybdate, 46.3-46.6%

f.o.b. Langeloth, Pa., per pound contained Mo $1.28

Ferrocolumbium, 50-60%, 2 in.

x D contract basis, delivered per pound contained Cb.

Ton lots	$12.00
Less ton lots	12.05

Ferro-tantalum-columbium, 20%

Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb cont'd Cb plus Ta.... $6.25

Ferromolybdenum, 55-75%, 200-lb

containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.46

Ferrophosphorus, electric, 23-

26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $90.00
10 tons to less carload $110.00

Ferrotitanium, 40% regular grade,

0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon,

0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.55

Ferrotitanium, 15 to 18% high

carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton $177.00

Ferrotungsten, ¼ x down,

packed, per pound contained W. ton lots, f.o.b. $3.80

Molybdic oxide, briquets, per lb

contained Mo, f.o.b. Langeloth, Pa. $1.27
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.24

Simanal, 20% Si, 20% Mn, 20%

Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk, lump	15.50¢
Ton lots, packed lump	16.75¢
Less ton lots, lump, packed	17.25¢

Vanadium Pentoxide, 86 - 89%

V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.28

Zirconium, contract basis, per lb

of alloy.

35-40%, f.o.b. freight allowed, ton lots	26.00¢
12-15%, del'd, lump, bulk-carloads	8.00¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed. B, 3¼%, Si, 40-45%, per lb contained B.... $5.25

Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4.5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.

Ton lots per pound	10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in., x D, Ton lots... $1.20
F.o.b. Wash., Pa.; 100 lb up

10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

No. 1	$1.00
No. 6	63¢
No. 79	50¢

Manganese - Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd, less ton lots $2.05

Silcas, contract basis, delivered.

Ton lots	45.00¢

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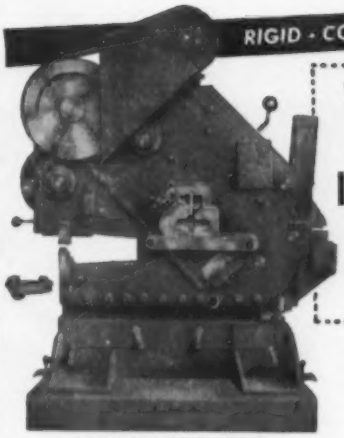

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- Flywheel shaft mounted on ball bearings

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Shears Plates	7/16"	½"	⅝"
Shears Flats	3-3/16" x 9/16"	3-3/16" x ⅝"	4" x ⅜"
Shears Angles (Square Cut)	3½" x 5/16"	4" x ⅜"	5" x ½"
Shears Tees	3½" x 5/16"	4" x ⅜"	4¾"
Shears Round	1-13/16"	1⅝"	1⅝"
Shears Square	1"	1¼"	1½"

For full details write to Dept. IA-1

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spiral . . . ⅜" to 75"
sykes herringbone . . . up to 60"
other herringbone . . . up to 90"
worm wheels . . . up to 98"
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pinions . . . any size
racks
(straight or curved) . . . any size

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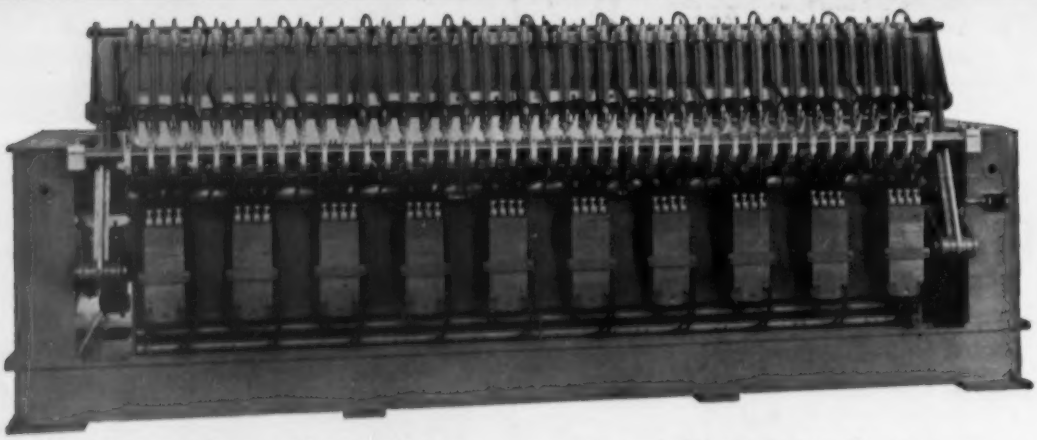
Standard 13 ft. Wire Mesh Welding Machine



Sixty Cross Wires per minute . . . 2" Min. to 12" Max. Spacings . . . Easily Adjusted Cross Wire and Longitudinal Wire Spacing . . . Hand-Started Pattern not required to start New Mesh Pattern . . . Cross Wire may be Pre-Straightened and Hand-Loaded or Automatically loaded with Cross Wire Feed Accessory . . . **Accessories Available:** Cross Wire Feed, Take-up Mandrel, Longitudinal Wire Straightener . . . (Three Handwheels Adjust All Longitudinal Wire Straightener Rolls in Unison.)

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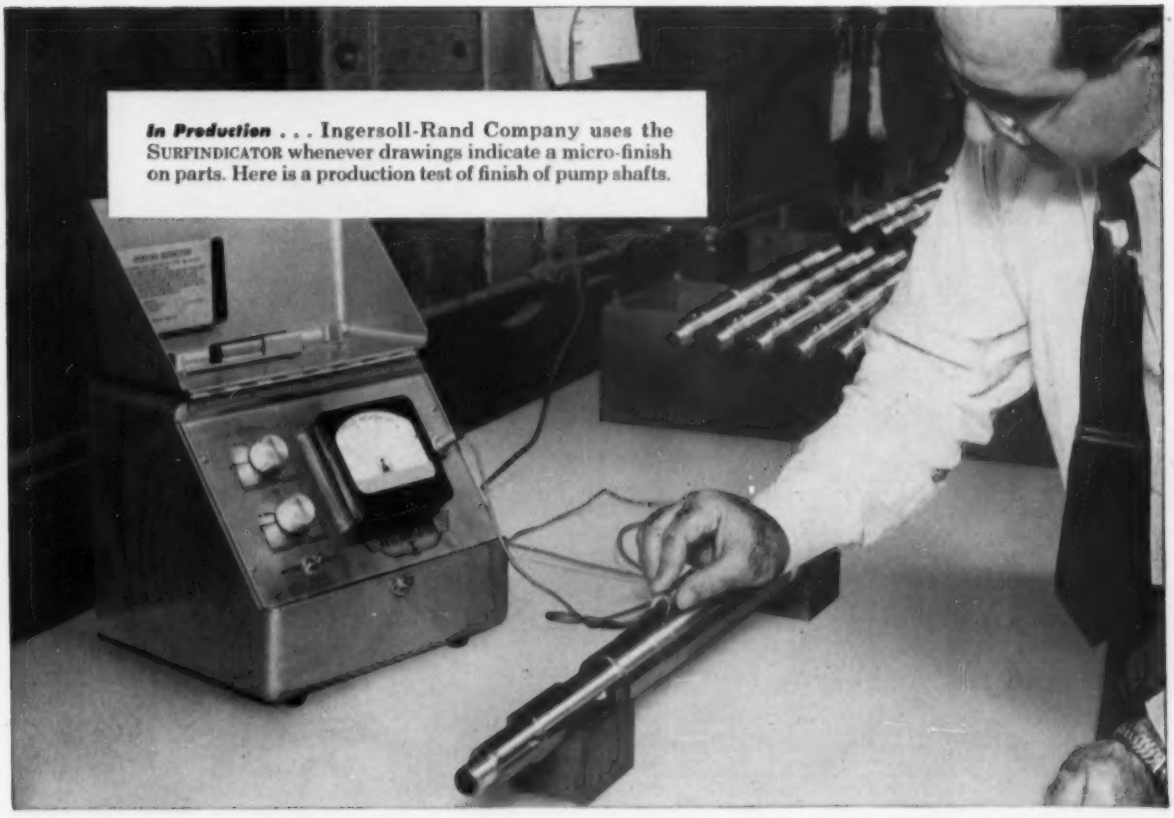
EXPERT WELDING MACHINE CO. 17144 MT. ELLIOTT AVE. DETROIT 12, MICHIGAN



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through better surface finish control

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. . . reduce machining costs by eliminating unnecessary overfinishing.

. . . meet specifications exactly.

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LARRY BELL, *President Bell Aircraft Corporation*

If your company does not have the Payroll Savings Plan, or if you have the Plan and employee participation is less than 50%—get in touch with Savings Bond Division, U. S. Treasury Department, Washington, D. C. Your State Director, U. S. Treasury Department, will be glad to help you install a plan or show you how easy it is to build employee participation in your present plan.

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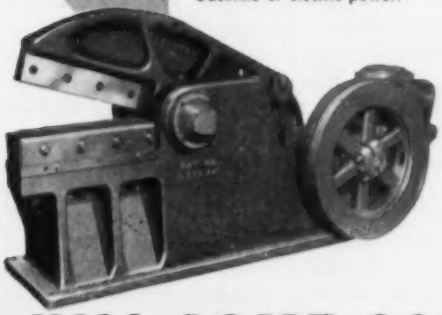

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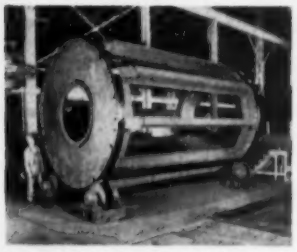

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THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Sun Shines On Coast . . . Used machinery picture in southern California is bright. Demand is strong for practically all types of machinery.

Dealers checked by THE IRON AGE feel this should hold through 1955. They point to the West's continuing industrial expansion as the best possible reason for their optimism.

But it's getting tougher for dealers to find the kind of machines that will sell. One man summed it up like this: "There's plenty of what we don't need—machines in poor condition. But what we *do* want is getting to be scarce. We're looking for late-model machines in good condition."

Buy At Home . . . Used machinery dealers are not yet in a spot where they have to buy equipment in the Midwest or East. They're still able to pick up enough saleable machinery in the West.

A few dealers say they're making occasional purchases outside of the West, paying the freight themselves. They do it only when they want to help a very good customer out of a bind.

Dealers see this partial solution to the supply problem: Companies expanding production will need some machines of faster speeds, closer tolerances, and higher capacities. To get them, most firms will have to buy new equipment. This, dealers hope, will release some late-model, good-condition machines for the used market.

Presses Go Fast . . . Sheet metal equipment is the fastest moving used machinery in southern California. Dealers say they have few in stock. "Punch presses, brakes, and shears don't get to stand on our floor more than a day's time," one big company said.

And with construction industry spokesmen forecasting a 20 pct increase in business this year, used machinery dealers look for sheet metal equipment demand to be mighty good. They hope the supply holds up.

Gives Rundown . . . Here's the outlook in other machine classes:

Lathes—Moving well, particularly in late models.

Planers—Calls limited to firms looking for machines to convert duplicators or skin millers.

Boring machines and radial drills—In fair demand.

Spotwelders—Needed in the area; most dealers say they could make more sales if the supply were not so scarce.

Welding machines — Fairly heavy buying of smaller sizes by construction and electronics industries. Larger welding units are moving slow.

Bay Prices Hold . . . In the San Francisco Bay Area, good used tools are selling well and prices are holding up. One dealer says business is about 25 pct better so far this year than it was last. He expects the present pace to continue for some time.

Another dealer, who says business is about the same as last year, claims "prices are coming down and quality is going up, making it more attractive for buyers to consider the purchase of used machinery."

Lathes, milling machines, radial drills, and power shears lead the list of fast movers in the San Francisco area.

Report '54 Lag . . . Metalworking machine shipments during 1954 had a value of about $1,072,799,000 against $1,386,198,000 for 1953, Commerce Dept. reports. The 1954 estimate included $821,450,000 for cutting machines against $1,138,-141,000 in 1953; and $251,349,000 for formers and shapers against $248,057,000 in '53.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDING ROLLS
8' x ¼" Bertsch Initial Type Bending Roll
12' x ⅜" Niles-Bement-Pond Pyramid Type
10' x ¼" Bertsch Initial Type Bending Roll
20' x 1" Hilles & Jones Pyramid Type Bending Roll

BRAKES—LEAF TYPE
8' x ¼" Dreis & Krump Size 186
12' x ⅜" Dreis & Krump, Motor Driven

BRAKES—PRESS TYPE
12' All Steel Press Brake, 250 ton Capacity
Model B-178 Verson All Steel, Capacity 12'x⅛"
Cincinnati All Steel Press Brake 10'x⅛"

CRANES—OVERHEAD ELECTRIC TRAVELING

3 ton Euclid	28' Span	230 Volt D.C.
5 ton P&H Trav-Lift	20' Span	220/440 A.C.
3 ton P&H Trav-Lift	28' Span	440 Volt A.C.
5 ton P&H	80' Span	220/3/60 A.C.
7½ ton Shepard-Niles	52' Span	220/3/60 A.C.
10 ton Shepard-Niles	44' Span	230 Volt D.C.
10 ton Harnischfeger	50' Span	220/3/60 A.C.
15 ton OET	45' Span	220/3/60 A.C.
15 ton Case	80' Span	230 Volt D.C.
15 ton P&H	97' Span	115 Volt D.C.
With 220/440 AC Generator Set		
25 ton P&H	60' Span	230 Volt D.C.
With 5 ton Auxiliary		
30 ton Whiting	60' Span	230 Volt D.C.
50 ton Niles	60' Span	220/3/60 A.C.
125 ton Cleveland	65' Span	220 Volt D.C.
With 2 Trolleys 62½ ton & 10 ton Aux.		

CUT-OFF MACHINE
Taylor Wilson Cut-off Machine, Capacity 2⅝" to 6⅝" Complete with Hydr. System & Elec. Equip.

DRAW BENCHES
30,000 lb. Draw Bench, 60' Draw
35,000 McKay Chain Draw Bench, 41' Length of Draw
100,000# Poole Draw Bench, Max. length of bar 20'
100,000 lb. Aetna Standard Draw Bench

FORGING MACHINES
1" 1½" Acme
8" AJAX with Air Clutch
1", 1½", 2½", 2", 3½", 4", 5" Ajax
1½", 4", 5" National
7½" National—Air Clutch

FURNACE—ANNEALING
Lee Wilson Annealing Furnace — Natural Gas
Work Dimensions 42" Coil, 96" Piling Height

FURNACE—HEATING
Rockwell Rotary Hearth Gas Fired Forge Furnace

FURNACES—MELTING
2 ton Whiting Hydro Arc, Top Charge
6 ton Heroult, Top Charge, with Transformer
10 ton Elec. Furnace Co. Arc Melting Furnace

HAMMER—BOARD DROP
3000 lb. Chambersburg Model J, Motor Driven

HAMMERS — BOARD DROP — STEAM DROP — STEAM FORGING—800 lb. to 20,000 lb.

LEVELERS—ROLLER
54" Aetna Standard 17 Rolls 4½" Dia.
60" Aetna Standard 17 Rolls 4½" Dia.
60" McKay, 17 Rolls 2½" Dia.
72" McKay 15 Rolls 4½" Dia.
76" Voss-Ungerer, 23 Work Rolls 2.165" Dia. Capacity 22 to 13 Gauge Mild Steel

PLATE EDGE PLANERS
35 ft. Southwark, 16 Pneumatic Jacks, M.D.
25 ft. Hilles & Jones, Capacity 1¼" Plate

PRESSES—HYDRAULIC
100 ton Southwark 4-Column, 14" Stroke Platen 18" x 24"
500 ton Wood 4-Columns, 24" Stroke, 72" x 96" Between Columns
1200 ton Hirdsboro 4-Columns, 20" Stroke 30" x 36" Between Columns

PRESS—TOGGLE
750 ton Bliss-Toledo Model 181-S Toggle Action Press, 42" Ram Stroke, 29" Blankholder Stroke, Bed Area LtoR 65", FtoB 60", Elect. Equip.

PUNCH & SHEAR COMBINATIONS
#2½ Buffalo Universal Ironworker, Punch 1" x ⅞" Shear 2" Sq., 2½" Rd., 6 x ⅜ Flat, etc.
Chatz All Steel Universal Ironworker NEW 1940 Capacity Punch 1⅝" thru 1¼", Shear 3" Rd., 2¾" Square, 6 x 6 x ⅝" Angles
Style W Cleveland Single End, 66" Throat, 312 Ton With Attachment for Dishing Heads

ROLLING MILLS
7⅛" Steckel Four High Rolling Mill
8" x 12" Blake & Johnson Single Stand Two High
10" x 14" United Three Stand Two High
12" x 16" Waterbury Farrel Temper Mill
12" x 16" Philadelphia 2-High Cold Rolling Mill
16" x 20" Waterbury Farrel Single Stand 2-High
16" x 28" Lewis Two High Two Stand
20" x 24" Poole Two Stand Two High
32" x 58" Three High Breakdown Mill

ROLLS—PLATE STRAIGHTENING
51" Bertsch, 7 Rolls 10" Diameter

SHEARS—GATE
48" x 1½" Mackintosh-Hemphill
90" x ⅝" Pels
90" x ⅝" Birdsboro
11' x 1" Garrison

SHEARS—ANGLE
6x6x1" Long & Allstatter Size B
8x8x1" Long & Allstatter Size C

SHEAR—BEAM
Pels DT-36-B Beam Shear, Capacity 3" to 15" I-beams 6x6x⅝" Angles, Belted Motor Drive

SHEARS—ROTARY
3/16" Quickwork Rotary Shear, 26" Throat
¼" Kling #250 With Flanging Attachment
⅜" Quickwork Circle Shear 18" Throat, Circle Cutting Attachment

SHEARS—SQUARING
8'x 3/16" Niagara 8E, Motor Dr.
10' x 3/16" Dreis & Krump, Motor Driven
12' x ⅜" American
120" x ¼" Niagara #810
156" x ⅜" Birdsboro

SHEARS—MISCELLANEOUS
Bliss Upcut Shear Capacity 44" wide x .062-.187" Complete with coil box, tables, etc.
Streine Sheet Mill Pack Shear for side & end shearing ¼" thick, 20" to 62" wide

SLITTERS
24" Stamco Heavy Duty Slitter
30" Yoder Coil Slitting Line, Uncoiler & Recoiler
28" Paxson Coil & Sheet Slitter
72" Yoder Sheet Slitter

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No. 0 Medart Continuous Automatic Straightening Machine. Capacity ⅝" to 1¼" Dia. Bars any length or up to 2" Tubing, Motor Driven
No. 2 Taylor Wilson Straightening Sizing & Burnishing Machine, Capacity ¼" to 1⅝" Tubing

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5,000 lb. Olsen Hydraulic LaCap Universal
2,000 lb. Riehle Model PS-2 Universal
50,000 lb. Baldwin Southwark Comp. Testing Machine
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100,000 lb. Tinius Olsen Universal
800,000 lb. Riehle Model MA300 Universal

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36" & 42" Bullard vertical turret lathes
No. 2 P. & W. Jig Borer, Model 1278.
3" Bar Yoder, table type, 1942.

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4' arm 13" col. Carlton radial, P.F., P.E.
8' arm 16" col. American radial, H.D.
4' arm 13" col. Feedick Hyd., new 1941.

GRINDING MACHINES
40" No. 16A2 Blanchard 2-spd. rotary, new 1946.
72" Hanchett 3-spd. rotary surface, new 1946.
6" x 18" Landis cyl., 30 deg. 4D, 1941.
16" x 96" Landis gap type cylindrical, new 1941.

LATHES
No. 5 Jones & Lamson ram type univ. turret (2) late.
14" x 6' Hendey Toolroom, 1940.
12" x 36" Monarch Model C, new 1942.
15" x 30" Lipe Carbo-Matic, 1942.
24" x 48" Monarch Toolroom, 1942.
No. 5 Gisholt, Pro-Selector, univ., new 1942.

MILLS
1-12 & 2-18 Cincinnati production.
1-2-3-4-5-6 knee type plain & vertical.
No. 3B Brown & Sharpe, pl. horiz., 1942.
24" x 24" x 12" Ingersoll adj. rail planer type, 1945.
42" x 42" x 18" Ingersoll adj. planer type.
60" x 48" x 16" Ingersoll adj. rail planer type.
No. 2M K & T plain horiz., new 1942.

PRESSES
105 ton No. 7½ Verson OBI (2) 1939.
106 ton No. 93C Toledo S.S., D.C., cushions.
180 ton 784G Verson Gap Frame.
150 ton No. 13-1 Cleveland OBI, late type.
300 ton No. 1039 Hamilton D.C., adj. bed, 60" x 102".
400 ton No. 663 Toledo K-J coining or embossing.
500 ton Baldwin Southwark HYSPEED Hyd., '39.
1000 ton No. 606 Toledo coining or forging.

SHAPER
32" G & E Invincible, F.M.D., late type.

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3½" Ajax, suspended slides, steel forms.
5" Ajax, suspended slides, steel frame.
1½" Natl. sup. slides, auto-lub. guided ram.

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D & K Plate Shear, capacity 10' x ⅜", 36" throat.
Hilles and Jones and Buffalo Bar Shears, 1½", 2", 2½", 3", 3¼", 4" and 4¼".
2-A Williams White hydraulic tube bender, capacity 2".
Long and Allstatter Horizontal Beam Bender, 24" beams.
Angle Shear, Double, 8" x 8" x 1".
Kling No. 6 Bar & Billet Shear, 6" round.
4000 Lb. Niles Bement Double Frame Steam Forging Hammer.
1500 Lb., 3300 Lb. Chambersburg Single Leg Steam Forging Hammers.
Chambersburg Board Drop Hammers, 800 Lb., 3600 Lb.
Nazel Air Forging Hammers, #4-B, #5-N.
Williams White Bulldozers, #22, #3, #4, #25, #6, #29 U type.
Ajax Forging Rolls, from #1 to #4.
Ajax & National Upsetters, Suspended Slides, 1", 1½", 2", 3", 4".
Upsetting and Forging Machines. Hot Suspended Slides, ⅝", 1", 1½", 2", 2½", 3".
100-Ton Oilgear High Speed Hydraulic Press, 2-Column, ram 27" x 23".
600-Ton Verson Knuckle Joint Coining Press.
Landis Landmaco Threading machines with lead screws four spindle 1½", two spindle ⅞", two spindle 1".
Multiple Punch, Size G, L & A, 940 Ton.
Single and Double End Punches, various capacities and throat depths.

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Qu.	KW.	Make	RPM	Volts D.C.	Volts A.C.
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1	500	C.W.	720	275	2300/440
1	400	C.W.	1200	125/250	440
1	300	G.E.	720	275	2300
2	200	G.E.	720	250	2300/440
1	150	G.E.	720	250	2300/440
1	100	Whse.	900	275	2300
1	100	C.W.	1200	125	440/220
1	85	C.W.	1200	250	4000/2200

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Qu.	HP	Make	Type	RPM
3*	3000	Whse.	Mill	600
1*	2000	Whse.	Mill	250/460
6*	1500	Whse.	Mill	600
4*	1200	Whse.	Mill	600
6*	800	Whse.	Mill	600
8	700	Whse.	Mill	285/700
1	350	G.E.	CD-160	1150
1	250	G.E.	MPC	325/975
1	200/250	G.E.	MPC	300/900
1	200	Whse.	Mill	300/1200
1	180	G.E.	MPC	400
1	90/166	G.E.	MPC	625/1125
1*	125	Whse.	SK-100	600
2	125	Whse.	SK-184	575/850
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	(These are T.E.F.C. anti-friction bearings)			
1	40	Whse.	SK-140	500/1700
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1	20	G.E.	CD-122	300/1200
1	15	Whse.	SK-93	575/1725
1	15	Reliance	155-T	400/1600
5	15	Whse.	SK-130L	500/1500
4	10	Whse.	SK-91	250/1000

*525 and 600 volt

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Qu.	Kva	Make	Phase	Voltage
3	750	Pitts.	1	23,000-2300
3	667	Wagner	1	23,000/11,000-2300/4000
3	500	G.E.	1	23,000/11,000-2300/4000
3	333	G.E.	1	13,200-2300
3	250	G.E.	1	2400-240/480
2	150	G.E.	3	2400/4150-240/480
3	100	G.E.	1	23,000/2300

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100 ton Wood Hydraulic Press, four col., single action
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14"x6' LeBlond, cone
14"x6' LeBlond Geared Head, s.p.d.
14"x6' bed Monarch, cone, motorized
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General Electric 3 bearing unit 720 RPM motor sync. TS, 375 HP, .8 PF, 220/3/60/982 amps. Generator 250 KW, DMC, 240/250 V, 1000 amps. Complete control equipment.

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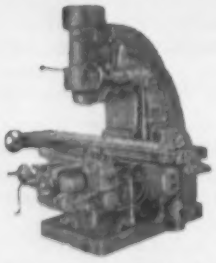

2 — No. 4CH KEARNEY & TRECKER Vertical Milling Machines, 15 HP main drive motor, 3 HP feed & rapid traverse motor, ¼ HP coolant motor; 24 speeds 15 to 1500; table 74" x 15½"; monolever control; back lash eliminator; coolant system; micrometer stop and dial indicator.

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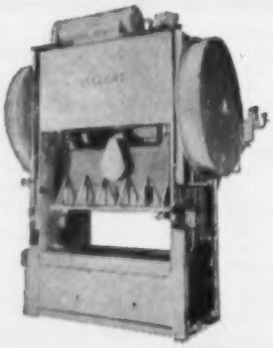

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1	2000	Whse.	Mill	600	330/460
2	1500	Whse	Rev.	600	600
1	1400	G.E.	MCF	600	65/190
1	1200	G.E.	MCF	600	750/950
1	950	Whse.	QM	250	140/170
1	900	Whse.		250	450/550
1	825	Whse.		250	95/190
1	600	Al. Ch.		250	400/800
1	500	Whse.	CC-316	600	300/900
1	500	G.E.	MCF	250	300/900
3	450	Whse.		550	415
1	250	G.E.	MPC	230	400/600
1	200	Rel	1979F	230	720
4	200	G.E.	CD-1650Z	230	500/1500
1	200	Whse.	CB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	85H	230	1150
3	150	Cr. Wh.	85H-TEFC	230	890
1	150	Whse.	8K-1511B	230	900/1800
1	150	Whse.	8K-201	230	300/950
1	130	G.E.	MCF	230	250/1000
1	125	Whse.	8K-161	230	500/1500
1	125	Whse.	8K-183	230	950

M-G Sets—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	D.C. Volts	A.C. Volts
2	2000/2400	G.E.	450	250/300	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
1	2000	G.E.	600	25eg 600	11000
2	2000	G.E.	514	600	6600/13200
2	2000	G.E.	600	600	2300/4600
1	1500	G.E.	720	600	6600/13200
1	1500	C.W.	514	30/115	4000/12000
1	1000	G.E.	900	250	6600
3	1000	G.E.	720	600	2300/4600
2	750	G.E.	720	275	2300/4600
1	750	C.W.	514	30/115	2300
1	600	G.E.	720	250	440/2300

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
1	5000	Whse.	OISC	3	2300x26400
1	2500	Whse.	OISC	3	26400/13200x460
3	2000	G.E.	HVDDJ	1	66000x13800
3	1000	G.E.	HVDDJ	1	2400x480
6	1000	Wagner	OISC	1	13200x460
2	667	G.E.	HD	1	13800x2300

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1250	*Al.-Ch.	ANW	1200
800	*Westg.	CS	3600
800	*Westg.	CS-1485	1800
700	*Westg.	CS	1200
700	Al.-Ch.	AN	900
500	*Al.-Ch.	8515-SW	1800
500	G.E.	KT-424	450
400	G.E.	KF-530	3600
400	G.E.	KT-424	360
350	Ideal	A	1800
300	*G.E.	K-6344Y	1200
300	G.E.	K-6353 TEFC	720
250	G.E.	KT-3396	1800
250	Westg.	CS8756	1800
250	*L.-Allis	QGK-148	720

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SEALED BIDS will be received by the Board of Water Supply, at its offices, thirteenth floor, 120 Wall Street, New York City, until 11:00 A. M., Eastern Standard Time, on Tuesday, April 5, 1955, for Contract 418, for furnishing, delivering, installing and testing chlorinating and appurtenant equipment for the Neversink intake chamber, located in the Town of Neversink, Sullivan county, New York, and the East Delaware intake and Downsville release water chambers located in the Town of Colchester, Delaware county, New York, and for furnishing and delivering air compressor units for the Rondout, West Branch and Kensico South effluent chambers, all as set forth in the specifications.

No bid will be received and deposited unless accompanied by a certified check upon a National or State bank, drawn and made payable to the order of the Comptroller of The City of New York, in the amount of six thousand dollars ($6,000.00), for the proper execution of the Contract.

At the above place and time the bids will be publicly opened and read. Pamphlets containing information for bidders, forms of bid and contract, specifications, contract drawings, requirements as to surety, etc., can be obtained in Room 1317, at the above address, upon application in person or by mail, by depositing the sum of five dollars ($5.00) in cash or its equivalent for each pamphlet. Within 30 days following the award of contract or rejection of bids, the full amount of such deposit will be refunded for each pamphlet submitted as a bid and a refund of four dollars ($4.00) will be made for each other pamphlet returned in acceptable condition. Arrangements will be made whereby prospective bidders desiring blueprints of the contract drawings for their own use may secure same, the cost thereof to be paid by them. For further particulars, apply at the office of the Chief Engineer at the above address.

IRVING V. A. HUIE, President; EDWARD C. MAGUIRE, HERBERT M. ROSENBERG, Commissioners, Board of Water Supply; BETTY COHEN, Acting Secretary.

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Should have 10 years experience with practical knowledge of clutches, cranks, bearings, and brakes. Engineering degree desirable but not essential. This is a permanent position with an old reliable well established company in the hydraulic press field—location in the East with ideal living and working conditions.

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Write giving complete particulars regarding personal history and work experience. Please include telephone number.

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To supervise operations of a merchant coke plant. Thorough knowledge of battery operation and by-product coke production necessary. Midwestern location. Technical graduate preferred. Age up to 45.

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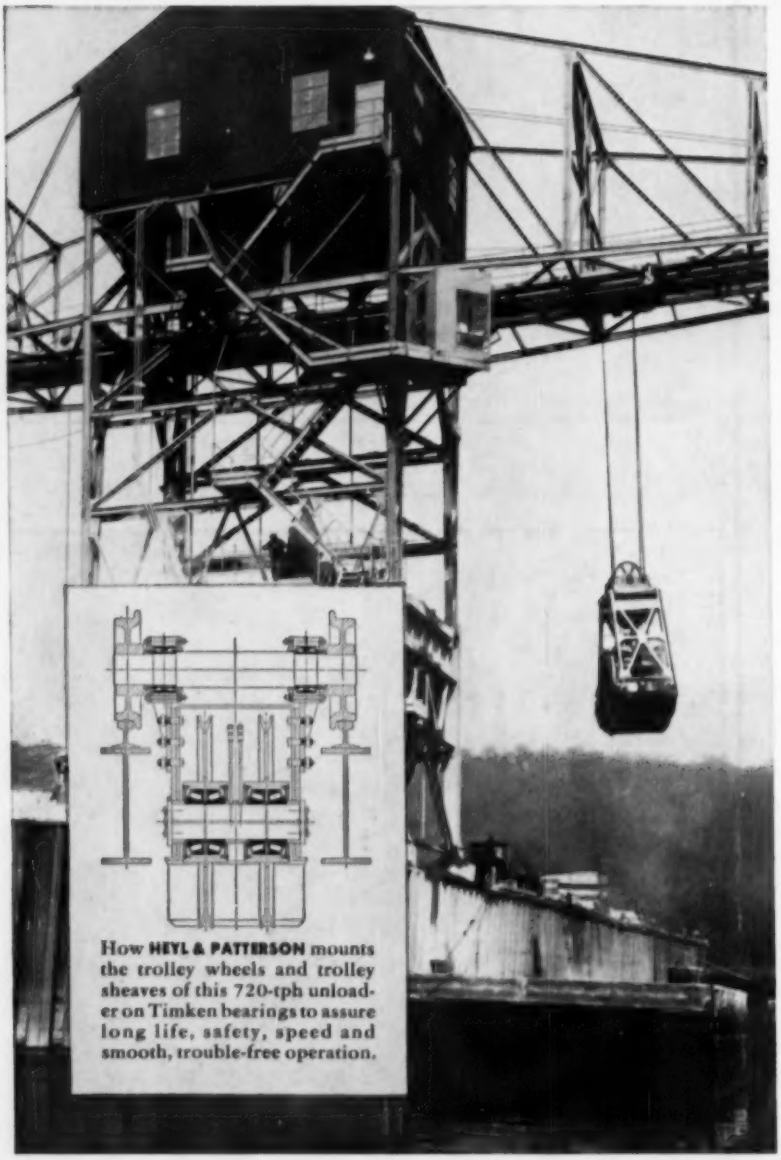

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